

VIBRATION AND LIFE



D. T. SMITH



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VIBRATION AND LIFE

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Nil tam difficile est quin quaerendo investigari possit



RICHARD G. BADGER

THE GORHAM PRESS
BOSTON

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The Gorham Press, Boston, U. S. A.

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PREFACE

IN venturing to offer to the reading public this outcome of nearly half a century of thought, study and labor, it is not without a deep sense of its imperfections, a lingering misgiving of the reception it may meet, and of uncertainty as to the value that may be accorded it.

The various departments of the subject embraced in this dissertation cover so broad a field, are so recondite and have called forth so many bold and venturesome hypotheses, that scant ground is afforded for the hope that it will not develop that many erroneous conclusions have been reached and that many of the facts adduced have been misinterpreted.

It may, however, be urged with reason that since so great a number of apt analogies between the general laws of external nature and those controlling the development and activities of organic life have been shown to exist, and so many striking and puzzling phenomena have been supplied with a plausible interpretation by the theory here sought to be sustained, that the truth even if not rightly apprehended, has at least been not remotely paralleled.

The principles here under discussion involve many of the most important interests that can evoke human concern or invite human attention. The operative factors in the case cannot be under the control of accident. The phenomena described must have a determining cause, and the forces underlying them must manifest themselves in conformity with natural laws.

At all events it may be confidently asserted that if nothing more has been accomplished by these endeavors, the treatment of the theme after the method here pursued

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cannot wholly fail to prove suggestive to the minds of other investigators and to incite further research and elucidation.

When the author first began to entertain and enunciate the views here advocated, he was not aware that any writer had previously broached them. Wider acquaintance with the literature of the subject, however, has revealed that similar thoughts have occupied the minds of others time and again. But no one, so far as yet appears, has hitherto attempted to reduce the underlying principles to a definite system, unless the effort of Swedenborg may be so described.

The anonymous author of "Vestiges of the Creation" closes the chapter of that work entitled, "The Mental Constitution of Animals," with the following suggestive words, "The inorganic has one final comprehensive law, GRAVITATION. The organic, the other great department of mundane things, rests in like manner upon one law, and that is DEVELOPMENT. Nor can even these be after all twain, but only one more comprehensive law, the expression of that unity which man's wit can scarcely separate from Deity itself."

Can it be that in the form of the most subtle vibrations, which the motions of the ultimate particles of material elements can impose upon the ether, is to be found the expression of that unity beyond which the wit of man may never venture, and which is threaded through and through with the law and the prophecy of evolution?

It only remains now to be said that, in the fond hope that these long-indulged meditations may not prove wholly empty of contribution in the way of assisting fellow wanderers toward better things and a higher and nobler life, this fruit of a life-long labor of love is confidently, but with deference, sent forth on its errand.

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INTRODUCTION

THE theme of the following treatise has been at intervals for more than fifty years, in one form or another, a subject of earnest thought and careful investigation on the part of the author. From an early period of his medical studies begun in 1861, the problem of the origin and reproduction of living forms with their incident functions has continued to press upon his mind for solution.

At first the response was crude enough indeed; but gradually new facts were gathered and new thoughts were suggested, until the matter began to take on the form of a somewhat definite theory. When some years later the author was required, as was then the custom, to present a thesis for the degree of Doctor of Medicine in the University of Louisville, the subject that had so much occupied his mind was selected for a theme under the title, "Progressive Atomic Development."

In this thesis the contention was urged that the soul is constituted of a peculiar and refined energy, which is inherent in a class of atoms likewise refined and peculiar but withal ponderable. But since all the coarse forms of atoms then known to chemistry seemed capable of passing from one individual body to another, and were constantly doing so, it appeared to the author to be quite improbable that such atoms could constitute the essential basis of life.

Furthermore, the contention seemed reasonable that every indication pointed to the conclusion that all the then

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known simple atomic elements, as well as their various combinations, have a uniform tendency to pass into a state of definite and stable crystallization.

It was thereupon inferred that processes, which to every appearance are uniformly antagonistic to crystal formation such as the vital processes in their constructive manifestations all seem to be, must in all likelihood be based upon a more refined atom than any theretofore taken account of in the current chemistry, and one of more complex capabilities. Likewise, the refined energy referred to as the assumed basis of life, was supposed to be as much more subtle than the common energy, as the vital corpuscle was supposed to be more refined than the coarse atom of the then current chemistry.

These supposed refined atoms with their associated vital force, it was assumed, have an inherent tendency to enter into the building up of definite and orderly organic forms, in some such way as the coarse atoms with their associated energy, tend to enter into the production of crystalline forms. It was further contended that the refined vital atoms are progressively modified and developed, while passing from the lowest forms of life up through intermediate forms to man. Toward man they were all supposed to converge, and to merge in him, thus constituting him literally and truly the microcosm.

The so-called essential vital atoms of this theory were supposed to maintain a constant movement of vibration and these vibrations operating in various groupings and combinations, directed the common coarse elements of matter so as to give form to all bodily tissues and organs, and ultimately to all thought, feeling and memory as well.

Step by step this theory was elaborated, modified and partly rejected, until in 1872 its discussion had attained the dimensions of a manuscript of some 200 pages designed

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for publication in book-form. The design was never carried into effect, however, but the manuscript is still preserved.

Several years later, when an opportunity was offered for the publication of a brief statement of the theory in pamphlet form, the title, "Philosophy of Memory," was chosen for it in preference to the original designation. Later still, when in the year 1898, the theory was set forth in book-form, along with a proffered solution of several other problems which pertain to natural physics, this title was still adhered to. In order to justify in some measure the selection of the title chosen, more particular attention was given in that publication to bringing out the psychic features of the problem, and this to the partial elimination or neglect of those relating to their physical or corporeal aspect.

In the form in which the theory is now set forth the title, "Philosophy of Memory," even under the most strained application, could not be made entirely appropriate. The title "Vibration and Life," given in the present publication has consequently been selected, though it too, it must be confessed, is not as applicable or as fully descriptive as might be desired.

Up to the time that an incomplete presentation of this theory was published in book-form, the author entertained no doubt that he was entirely original in the views set forth. But some two years since he was agreeably surprised by having had pointed out to him the fact that Plato had suggested the relation of vibrations to vital manifestations. Quite recently he has had an opportunity of examining a booklet by Immanuel Swedenborg entitled, "On Tremulation" in which similar views are maintained. This work of Swedenborg was written in 1719, or nearly two hundred years ago, but not published in this country

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or translated into English until 1899, a year subsequent to the publication of "The Philosophy of Memory" by the author.

The title or heading of the first chapter of Swendenborg's treatise is "Arguments showing that our Vital Force consists mostly of little vibrations, that is, Tremulations." This, it must be remembered, was long before the discovery of the vibratory nature of light by Sir Thomas Young, or of the discovery of the character of energy in general.

But Swedenborg goes even farther and treats, though not always consistently or clearly, of extremely fine vibrations for which he coins the term "contremiscences," thus again paralleling and anticipating the notion of extremely subtle vibrations suggested by the author.

Vibration as the expression of every possible character of the manifestation of energy is now coming to be almost universally recognized, and it is not believed that in the final outcome, less will be conceded to it than is claimed for it in this essay. As regards the momentous vital principles and mental, moral, and religious laws involved in the investigation and discussion that follows, the reader must be left to decide whether or not progress has been made toward their elucidation.

That more than a beginning has been made toward overcoming the difficulties and surmounting the obstacles that encumber and beset the problem, the author would be only too happy to feel assured.

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A THEORY OF ORGANIC EVOLUTION BASED ON VIBRATION

UNTIL quite a recent period investigators sought to gain insight into the workings of the human mind, mainly through the interrogation of consciousness. To this task large numbers of the most acute intellects of preceding ages addressed themselves, and seemingly everything of practical value attainable by that method had been revealed. Such an impression was greatly strengthened by the marked barrenness that had characterized all recent efforts in that direction.

With full recognition of the wealth of knowledge revealed by this method, but convinced that the mine was practically exhausted to it, the world of science and philosophy gladly welcomed the advent of the doctrine of evolution as seemingly offering a more promising outcome. And evolution has indeed shed a flood of light into many dark recesses hitherto almost wholly unexplored. It has in this respect been truly rich in revelation; but many questions of the deepest import it has left, and seems destined still to leave, practically untouched.

Still more recently a new school of psychologists has arisen, or rather it might be said that the adherents of the older methods of investigation have joined in the expedient of seeking by direct experiment to ascertain the nature of mind or life on the psychic side, as physiologists had long

studied the manifestations of life on the physical side. Very much that is both interesting and instructive has in this way been disclosed and doubtless still more of even greater value will yet be discovered. But this method also is clearly destined to fall far short of a full and satisfactory solution of the difficult problem.

It remains then to endeavor to combine all of these methods and to supplement them with any helpful inferences that may be drawn from whatever is known of the plan or the rule and order of nature in the development of life, before we can hope to lay bare this most recondite of her secrets. Such an undertaking involves necessarily the entire problem of life, and even the still broader question of the nature of energy in general.

For, deeply interesting as are the many questions relating to the phenomena of what is known as mind, there are others still more enchaining, still more recondite, that present themselves to the thoughtful inquirer into the nature of the original source of mental manifestations. These questions relate more especially to the principle of life itself, to the quickening essence of which mental manifestations are merely the products on the one hand, even as physical forms are on the other.

THE NATURE OF LIFE

What then is life? What is the soul? From what vast mysterious storehouse comes the unending well of vital energy that feeds the illimitable stream of life? And whither does each vital spark betake itself when it has ceased to animate or vivify the body it has built and occupied for a habitation? These are inquiries that have never failed seriously to impress themselves upon earnest seekers, and they involve also questions that no man has

yet been able to answer with anything like entire satisfaction to himself, or to any discriminating searcher for truth.

The essence or even the substance that lies at the foundation of the phenomena of what we know as life and mind, it is not a venture to predict, will never be fully grasped by the human understanding. Whatever of light is shed upon the matter, whether gathered from introspection, from evolution or from experiment and analogy, must ever remain more or less obscure and uncertain. And even after help from every possible source has been invoked, and illumination from every flickering lamp has been borrowed, we may still only lightly hope to discern more than the first glimmerings of the dawn.

And if mind and matter on the one hand seem to present to the investigator an impenetrable mystery as regards their ultimate basis, the body on the other hand, is well characterized as being, "fearfully and wonderfully made."

At one period of the life of every animal and every vegetable, the potency in the individual of all that it is ever to be, become or possess, of mind or body, exists in the form of a microscopic cell. In that cell there dwells the potentiality of all the physical form and mental function that ever after may appear or be developed.

This does not apply to the coarse atoms such as carbon, sulphur, lime and the like, but to particles or corpuscles which no crucible as yet has ever caught or aided vision reached, and the product of whose peculiar crystallizing forces are organic forms. It is hoped to show in these pages, that it is such corpuscles as these which, by reason of the vibrations that are the expression of the energy that is inherent in them, build up the body as they also build up the mind; and that in them mind and body find a common starting point where they substantially meet and merge.

It is the life history of these refined elementary corpuscles that is involved in the philosophy of vibration, which under the title of "Vibration and Life," it is here sought to portray.

TERMS DEFINED

Preliminary to a discussion of the theme, it may be well first to mark out the limits of the field of our investigations, in order to point out what particular subjects these investigations are to embrace, and also what we are to understand by the particular terms to be employed.

But before attempting to define and to set forth a conception of what is here understood by the terms, "soul," "life," and "mind," it is important, if not indispensable, to ascertain wherein lies the essential difference, if there be a difference, between the class of beings distinctly and admittedly possessed of intelligence, and the class or classes apparently without such endowment, and also whether a positive line can be drawn between the living and the non-living, between the organic and the inorganic. Briefly speaking, it is impossible to lay down any constant rule, or to draw any hard and fast line on a basis of either mental or physical characteristics between man and the lower living forms, or anywhere among these lower forms; or even to say with assurance that by such rule or by such line, one part is distinctly separated or marked off from the other.

Passing down the scale of organic beings, we find man and lower animal forms successively and gradually merging the one into the other, until we reach the very lowest grades of animal life, and even down through intermediate forms into the vegetable kingdom and the borders of the inorganic. Here for the first time, between the

organic and the inorganic, do we find a distinct and unmistakable line of demarkation. That line is constituted by the power or the capacity of automatically reproducing each after its kind. On one side of this line every species of being is favored with the power of reproducing in this way, on the other side none is so favored.

In order to be enabled to realize the completeness of the distinction indicated by this division, it will be necessary first to examine briefly some of the characteristics of what are known as forms of the common force of nature, or the universal energy; and then to compare some of the principles by which these are governed with certain of the laws or rules that seem to prevail with the manifestations of the so-called vital force.

CHARACTERISTICS OF ENERGY

The common forms of force, or the particular manifestations of the universal energy, as exhibited in the form of light, heat, actinism, chemical affinity, magnetism, Roentgen rays, radio-activity, mass motion, and the like, are all known to be convertible the one into the other, and that without any gain or loss that cannot be accounted for. It is now held as demonstrated truth, and has, indeed, become an accepted canon of science, that no addition to, or diminution of the total of the energy in the universe, can at any time or by any power be effected. It is also held by the highest order of minds to be wholly unthinkable that energy ever could by any possibility or by any power whatever be either created or annihilated.

If the power of creating energy were conceded to a being of even infinite might, it could mean nothing more than the possibility of transforming infinite will or power into a special form of energy. And if there be conceded

a creator separate and distinct from what is conceived to be creature, the creative act could be nothing else than the transformation of creative energy or creative power, into created thing or creature. Furthermore, if a creator could transform any part of his power, which is himself, into forms separate and distinct from, and it may even be inimical to the will of such Creator, then all energy can be so transformed. In that event the Creator will have become wholly creature, and will have abdicated the control of the universe. Then will have supervened that state which in name is dreaded by so many, and even regarded with something akin to horror—a state of true atheism.

A quantity of coal or other combustible, when consumed, will produce by the chemical union of its elements with the oxygen of the air, a definite measure of heat. This heat may in turn be transformed into light, electricity, or magnetism, and each of these may be successively employed in imparting motion to a mass, or in the performance of various kinds of work.

But this light, heat, electricity, magnetism, or mass motion, cannot in any true or ultimate sense, be said to have been produced by the chemical affinity of the constituents of the coal and oxygen. The chemical energy latent in the coal and oxygen has simply been changed or transformed successively into these several forms or special manifestations of energy. Furthermore, if after carrying this energy through every possible form, and then back to the one begun with, we could gather up all the waste and all the spent energy, we should have exactly the quantity with which we began. Absolutely none has been destroyed as none has been produced.

THE VITAL FORCE

But with the vital force, or what seems to be the force employed and manifested in the reproduction of living forms, the case is apparently different. An acorn planted in the earth grows into a great oak, and year after year, often it may be for centuries, this oak will bear hundreds of thousands of acorns each identical in every material respect, with that from which it was itself produced. Each of these in turn may produce other oaks, the exact counterpart of the parent tree, until in this way countless millions of such trees will have been brought into existence, every one identical, as relates to the quantity and character of its vital energy, with the original or parent oak.

Countless millions of tons of matter have here been arranged into the form or likeness of trees, apparently in opposition to the force of gravity and certainly in opposition to, and in defiance of the ordinary laws of decay. The same is true of any form of organic life whatever, that may be chosen for experiment or observation.

The case as here set forth, would have its parallel in that of a railway engine loaded with all the cars it could draw, which could yet move on with undiminished speed and ease, if there were attached to every car of its train, on a parallel track, a new train, and still an additional train attached to every car of each of these trains, and so on unendingly. Or if an eddy set up by the motion of a finger in the sea should start up a circle of eddies around itself, and each of these set up a circle of eddies beyond, until the entire ocean should come to consist of a mass of eddies, all derived from the energy springing from the first, there would be presented an exact parallel of what seemingly occurs in the progress of reproduction among organic forms.

It will be shown later that the concurrence of other elements is indispensable to the accomplishment of the results observed in reproduction. But insofar as appears on the surface of things, and in line with current teaching, reproduction is the one feature in which organic things differ from inorganic. As far as the life principle is concerned, it may be truly said, "No man can tell the difference between the spirit of man that goeth upward, and the spirit of the beast that goeth downward toward the earth;" nor for that matter between the spirit of man and that of the plants of the field or the trees of the forest.

COMMON NOTIONS OF THE SOUL

We may as well dismiss at the threshold of our investigation, all such notions of the soul as are derived from tradition or reports of visions of ghosts or spirits that men have so often claimed to have experienced. The prevalent conception of the soul or spirit arose among men, no doubt, at a period so early that the race had not yet learned to make a distinction between dreams and reality. A man lost a kinsman or a friend, to whom he had been attached in life and who after death appeared to him in his dreams. He very naturally concluded that the dead person continued to live, since he still saw him and may be conversed with him in his sleep. Out of dreams and myth, illusion and imposture, have doubtless arisen all existing stories of ghosts, spirits, or visible souls.

With a little alteration of the text, we might borrow a declaration supposed to be inspired and say "No man hath seen a spirit at any time." Nearly, if not quite all the spirits supposed to have been seen in the past, have appeared in periods of ignorance and to ignorant or very impress-

ionable people. They appeared as a rule, clothed in dress appropriate to the season, the fashion, and the age, and they commonly traveled by such conveyances as were in vogue among the living. If such visions prove the existence and appearance of the disembodied souls of men, they certainly also prove the same for clothes and wagons and horses and other equipments and means of conveyance.

If we are to base our notions of the nature and appearance of souls, on the reputed popular observations of the past, we are required to believe that the souls of men, weary of looking after the welfare of the bodies to which they are attached in earthly life, cast off these bodies, and then loading themselves with clothes which they change according to the requirements of the weather, the season and the prevailing fashion, and encumbering themselves with various clumsy conveyances or the spirits of such conveyances, wander about aimlessly over the earth manifesting themselves here and there capriciously to a favored and interested few. Indeed the very word "soul" as hitherto understood, might be eliminated from history and tradition as well without involving the loss of a single authentic intelligible fact.

SOUL, THE AGENT OR ACTIVE PRINCIPLE OF REPRODUCTION

If the term soul is to be retained as a biologic entity, or as a designation of one, it would appear to be more applicable to that principle of force or form of energy, that guides and determines the reproduction of living beings. It is only in such a principle that we may discern an office for the soul or the working principle of life. Nor is it easy to conceive any possible process of reasoning that

will give man a soul, which will not at the same time accord a soul to every living thing whether animal or plant.

That which is commonly understood and designated as the mind, in so far as this may in the present state of knowledge, be surveyed and comprehended, presents itself as simply a function, a mere incident of the play of the vital forces, possibly operating through a basic structure of refined corpuscular elements present in the cells of the nervous system; a mere incident of the activities of the soul or vital principle eliciting psychic manifestations on the one hand, and effecting the building up and maintaining of the physical form on the other. Mind and body are twin structures, and may be regarded alike as products of the workmanship of the soul or active vital principle, and no more identical with such principle than the flesh of the fruit or the tissue of the leaf, is identical with the subtle essence that determines the reproduction of the tree after its kind.

It is obvious then, that if there is a distinctive determining principle of life in every plant and in every animal, or even in every human being, if we so restrict it, differing permanently in its characteristics from the universal energy, that principle or force must be of universal extent, or else must be capable of unlimited division while each of the resulting parts after the division, remains equal in magnitude and power to the original whole.

On the other hand if the vital force or energy which is engaged or employed in the production of vital manifestations, and especially in the office of reproduction, is a modified form of the common force or energy, it appears to be in many respects unlike any other form of that energy with which we have any acquaintance.

If, as first supposed, the vital force or energy is of a

nature essentially different from the common force, that is to say, if it is a separate and distinct form of energy, then we are compelled to assume that there is about us in the natural world, an unlimited store of this peculiar vital energy out of which souls or vital units may be formed. In that case, the vital spark that animates each individual being must be only a particle or corpuscle with its attendant force, or a group of such, or it may be an electron or an assemblage of such elements drawn from a veritable ocean of life.

Let us for illustration, in deference to the views of those who profess to believe that man alone is possessed of a soul, consider the case of a single pair. In tracing the line of descendants of such a pair, we soon find ourselves at a loss to conceive how it possibly can be that the individuals of even the second generation, could by inheritance become possessed of a soul the exact counterpart of the souls of their parents. Nor would it be possible to conceive whence could have been derived the substance or essence to endow even one of such individuals while the parent still lived, if at the beginning the only available soul-stuff was that of the original pair.

Let us assume, for example, that the male of each generation should be the father of ten children, out of possible thousands. The first of such a line, after no great length of time, would have millions of descendants soon ripening into billions, each and every one endowed with a soul exactly as the original had been. The results are the same when we consider the case of the woman instead of the man, except that the possible number of offspring is more limited. That is to say, the original soul or pair of souls must have been divided again and again into millions and billions of parts, each in every way equal to the original whole; and this too, while leaving the ancestral endowment

undiminished, untouched and unimpaired in its integrity. Whoever can convince himself of this, is safe from every assault of logic, science, or philosophy.

RESUME OF ARGUMENT

As a resume then of the argument, it appears that we are restricted to one of three alternatives in accounting for the origin of souls, or whatever the segregated portion of vital energy in each individual may be denominated.

First: It may be assumed that the entity called the soul is something created for each individual that comes into existence; or that it is specially created for each human being at least, if we are willing to concede that souls are restricted to human beings.

Second: The vital energy or soul may be regarded as but a transformation of the energy common in the natural world, and not differing from the common energy in any essential or material characteristic.

Third: It may be assumed that there exists in the natural world, possibly pervading all space, a vast or limitless store of a special or peculiar energy out of which souls or vital entities are formed, or from which the individual soul unit is segregated at the moment of fecundation.

As to the first assumption, namely: that a soul is specially created for each individual about to enter into life, this must be left to those who deem it worthy of a moment of serious attention.

The second suggestion, namely: that the vital energy or soul is but a transformation of the common energy of nature, and differing from it in no essential feature, appeals much more forcibly to reason. We cannot yet say what modifications are possible to the common force. For all that we know with certainty, it may be that the common

force can be transformed into what is known as the vital force or vital energy. It is well known that vital manifestations are dependent on heat and chemical affinity, and most probably on electricity also, for in the absence of any of these life ceases at once and completely.

We might then infer that the vital force and the common force have a meeting point where one passes over into and is merged with the other; otherwise there would arise a probability that the one could not influence the other. This is the case with the various modes of common force in which one form affects another simply by being transformed into it. But if we attempt to carry out the analogy and seek to ascertain whether the force which controls matter is transformed into matter, or whether matter whose motions produce the known manifestations of force, can be resolved into force, the analogy fails in so far as we are able to perceive. Yet force or energy and matter may ultimately prove to be one.

The vital force then might possibly be a form of force, different from the common force, and still be ministered to by it, and in a measure controlled by it, if we may draw an analogy from the interactions of force and matter.

We have already considered the possibility that a peculiar soul energy or vital energy constituting the endowment of an original pair, might be divided and redivided, unendingly, to furnish a soul for each of the descendants of that pair; and found that this is unthinkable and impossible, in view of the accepted notions of the persistence or conservation of energy.

If the vital energy is not a form of the common energy, but wholly distinct from it, there must be a limitless reserve of it in nature, which may be drawn upon as it is required by or for each individual coming into existence.

Or as already indicated, the peculiarity of elementary

conditions which confers the power of giving rise to living forms, may be due to certain atoms or corpuscles, different in size and character from any yet discovered, which together with the forces connected with them constitute the basis of vital manifestations. In this case, that is, in the case of the existence of vital atoms or corpuscles, the common forms of energy might suffice for vital manifestations, and all peculiarly vital phenomena might be determined by the interactions of the common energy operating from or through such peculiar atoms or corpuscles.

AN OCEAN OF LIFE

The earth, then, is in every likelihood immersed in an ocean of vital energy, if indeed the universe is not filled with it, possibly differing only in form from the ordinary manifestations of the common force, and most likely linked with atomic forms of a refined nature which are as yet unappreciated.

It is the degradation of this energy or a partial effectuation of its tendencies, that supplies the power or force for the production of all living forms. The elements surrounding us are apt and ripe for the bringing forth of endless kinds and numbers of living forms; tending and seeking to do so, and only waiting to be directed by a guide, which is supplied in the energy of the germ plasma, to begin shaping themselves into new individuals.

No infinite division of the life principle of a primeval ancestor need be invoked. The appropriate elements are ever and everywhere abundantly at hand in the natural world. As the Hindoos long ago taught, one soul sets up another, life sets up life, out of these elements as one lamp lights up another, and this without diminution of its own flame.

IS ALL LIFE ONE?

Assuming then that there is in nature a peculiar vital energy, whether it is grafted on the common energy or is a modification of it, has this energy a separate form for each grade of life, or does there exist only one principle of life which is in some way modified for each kind of living organism, or even for each individual?

A study of the various forms in which life presents itself leads almost inevitably to the conclusion that there exists a close relationship if not a substantial identity, between the life principle in man and that of all lower forms of beings whether animal or vegetable.

The respects in which they all respond to modifying influences are exceedingly numerous. In the process of growth, all organic forms appropriate and utilize practically the same chemical elements; and especially is this true of such products as may be devoted to the nutrition, either of the parent itself or its off-spring. The food of man in so far as it is derived from the vegetable kingdom, is almost wholly the pabulum laid up for the young vegetable by its parent form. Life in both plants and animals prevents disintegrating chemical processes, and affords in a marked degree protection from decay. Thus a tree may continue to grow for centuries, resisting decay even at the heart where no cells capable of destroying microbian forms may have existed for ages; yet as soon as it has been deprived of life, it may at once under conditions otherwise unchanged, begin rapidly to decay.

Vegetable as well as animal organisms possess the power of reacting against a multitude of injuries of various kinds, and in a specific way against injuries inflicted by the action of various lowly forms of life. In this respect

they notably resemble each other. When the germs of various diseases, such as measles, scarlet fever, anthrax, and the like, invade the bodies of animals capable of reacting against them, they arouse on the part of the organism, a special defensive process or special form of eruption, different for different classes of infecting germs, but constant for each one and the particular disease to which it gives rise.

So among plants, during the season of growth, there may be observed a great variety of reactions against the injuries inflicted by individuals of many kinds of insects or by other hostile agencies. In one case it may be a vinegar ball that will be produced, rich in acetic acid. Around the egg or the sting-wound of another insect will be developed a nutgall charged with tannin. In still another case, a wounded branch or leaf will respond or react with a puff-ball; and so on until a great variety of such excrescences are produced. But in every instance a definite kind of growth will take place in response to each particular kind of injury. It has been discovered also that the plant, like the animal, reacts against gross injuries in a way that suggests something more than an accidental correspondence. Thus in the neighborhood of wounds, a more vigorous growth will take place than is met with elsewhere. Likewise, the material employed in the repair of injuries in both animals and plants is of an exceptionally low order of vitality; connective or scar-tissue being employed by nature for such purposes in both classes of organisms. Like animals, vegetables maintain a temperature above that of the surrounding atmosphere or other environment, and this even in the winter season when they are dormant. And strange to relate, a tree or plant and its fruit as well, when wounded suffers a real inflammation with rise of temperature. They have truly a fever.

Species of plants are known that entrap insects and use them for food, secreting a kind of gastric juice, and in the truest sense digesting their victims. Indeed, in man, as in all other animals, the final work of digestion is accomplished by the leucocytes which are closely related to the protoplasm in the cell-structures of plants.

The protein compounds in vegetable organisms are practically identical with the same elements in animals; and the frame-work or skeleton in both classes of organisms the feature in respect of which they mostly differ, is yet a secretion, or excretion. if it may be so called, effected by the albuminoid protoplasm in each.

Reproduction in both is accomplished in a way that is substantially identical. Parthenogenesis, or virgin birth, represented by fission, which is general and even exclusive in the lowest forms of plants, extends up to the lower animals and even has its counterpart in man, where its attempt by nature often results in the production of dermoid cysts and tumors. But for the most part in both the animal and vegetable kingdoms, reproduction is effected by the union of a male and female element. In the flowers of many plants, the male and female organs seem often to make intelligently directed efforts to meet each other in the fulfillment of their functions.

The power of transforming inorganic into organic material is in the main a function of vegetable activity, but one that is also possessed by the lower orders of animals. Indeed, vegetable and animal life are so linked together by intermediate transitional forms, and the two have so many properties and functions in common, that it is concededly impossible to tell where the one leaves off and the other begins. Sensibility is a characteristic of all animals, but to a certain extent it is possessed by plants also, and the conviction that plants possess a species of

intelligence, not to say consciousness and even conscience, has been given a constantly growing, if even qualified recognition among independent thinkers and observers.

There are indeed many activities in plant life that cannot be satisfactorily explained except on the assumption of a principle of intelligence, and a principle too that is ever present in its operation. A wild pea vine, whose ancestors for untold generations have been climbing trees by means of tendrils, if compelled to support itself on the face of a smooth stone wall which its tendrils cannot grasp, will enlarge the tips of its tendrils into suckers and by their help cling to the smooth hard surface for support.

Innumerable other examples drawn from observations of plant life might be offered, all going to show that a certain logical adaptability is inherent everywhere in vital processes. If then there exists in nature a peculiar vital energy, an energy that differs essentially from the common energy and constitutes a special and separate soul-stuff, it is possibly one and the same for all things that multiply and reproduce after their kind.

This vital principle or soul-stuff, as we shall see later on, must either be modified for each separate individual or species that comes into existence, or else there must exist in nature a vast quantity and variety of vital corpuscles whose attendant force is the vital force and which are sufficient to meet the requirements of every form and character of living thing that ever has existed or ever will exist. And if these vital corpuscular elements extend throughout the universe as is most probable, it follows that forms of life and various vital phenomena, are substantially the same in every inhabited world of the universe. Having endeavored to set forth in an intelligible way, the author's conception of what might be designated the vital force or soul principle or element, and some features

of its manifestations in different forms of living things, we may now return to a more direct discussion of the nature of mind.

THE NATURE OF MIND

By the great majority of philosophers, and more particularly those of former ages, mind has been regarded as an entity separate and distinct from the body; and by many as equally separate and distinct from the soul. Indeed the expression "soul, mind, and body" has been widely used as a term necessary to be employed in order to embrace and designate the entire being; the body being meantime, regarded as the mere temporary, perishable home of the mind and soul which are regarded as separable and immortal entities.

We may select then, for that inspiring entity, the vital force which presides over reproduction, and directs the building up of each new being after certain definite, logical and orderly patterns, and which when rightly played upon by the common force or energy of nature, or it may be when rightly ministered to in such a way, gives out the phenomena we call mental, in the same orderly manner that it builds up the bodily structure of the individual.

It has been poetically said that "Flowers are the thoughts of God." But in accordance with the view here presented, it may be said that all organic forms and all definite inorganic forms as well, are thought-forms. As truly are they such as are ideas, judgments, memories or any other products of so-called mental activity. They all result from the tendencies or direction of movement or directive action inherent in the corpuscles that are the primary basis of life.

The highest and most perfect examples of soul-work

in the realm of mind are produced outside the domain of consciousness. Such are the productions of genius which in accordance with its wont leaps to conclusions, and often conceives the outcome of its work while yet the inspired steps that lead to it are hid away in the subconscious. Indeed its creations are often effectually developed before they appear on the threshold of consciousness and are even practically complete before consciousness has the opportunity of passing upon them.

To the genius himself, the inspiration to such work often seems to come from without, and even to spring with surprising suddenness from a higher power. If we but closely observe we shall find that the great mass of our thoughts well up into consciousness already largely fashioned; spring up from the secret chambers of the brain as plants out of the ground, or as buds unfold out of the darkness into the welcoming sunlight.

"Some Milton pregnant with poetic fire," was an apt and happy characterization borrowed from the language of a poet and a seer, and employed in the description of a genius with its unfoldings still in the hands of destiny. For Milton like many another tabernacle of genius felt the quickening of the child of his brain long ere he knew what it was to be, in either form or feature; even as the mother yet to be is wont to feel the quickening of her still unborn.

THOUGHTS AND THINGS

The correspondence or resemblance so often manifested between thoughts or ideas and organic forms, already alluded to, finds its ready counterpart in the relation of resemblance of thought forms to inorganic things as well. We may perceive in the shape and structure often assumed

by inorganic substances, something like the same logic of arrangement and the same orderly sequence of development in the resultant groupings, when inorganic elements are responding to the action of the various modifications of the common force or energy, as is observed when the vital force is effecting the production of living things and developing their functions. And what is more remarkable still, these forms and groupings almost invariably take pattern and coloring that are agreeable to human tastes.

The well-known example of the formation of elaborate and flower-like figures effected by placing dust particles on a tense membrane, and then causing this membrane to vibrate by means of musical notes is a case well in point. The photography of sound waves supplies numerous instances. Every one has observed with what marvelous variety and beauty frost flowers form on window panes, when the weather is cold and the air charged with vapor, while few objects are to be met with more attractive to the eye than the elaborate mosaics brought out in the surface of the ground while freezing.

Among "the treasures of the snow" is an infinite variety of forms, all strikingly beautiful to the human eye. To these might be added any number of similar examples, in all of which the harmony seems as complete and the symmetry as apt as if the figures were intelligently and purposely designed for the gratification of human taste; or as if man's sense of beauty, harmony, and comeliness had been expressly created for the appreciation of things as they are.

It has been demonstrated by Professor Goldschmidt, the eminent crystallographer of Heidelberg, that the arrangement of notes and the blending of tones and overtones in music are subject to the same laws that crystals observe in the arrangement of their facets and angles.

Through this interesting ^{discovery} discovery he was enabled to accomplish the analysis of many high class and complicated musical compositions in which analysis had hitherto been found unattainable.

The lesson to be drawn from these interesting facts is that there runs through all nature, a tendency to the formation of definite and orderly groupings of the particles of matter, and that the forms of these groupings indicate the tendencies or the directions of the force that moves them and places them in position. Such facts also teach that the workings of our minds are subject to the same laws that govern material forms, and that such forms and groupings find in our minds a response and approval that go to show that the laws of thought and those of the tendencies of vital or soul force, as well as the common or natural forces, are alike in their essential nature.

The flower and the shell, the mosaic of the frost, and the myriad-formed crystals of the snow, the soul-stirring symphony and all other objects of their class, appear to our minds to be beautiful, because they are developed on a plan that finds a ready response in our mental constitution. They are such as we should create them, had we creative powers and the ability to surrender ourselves fully to the guidance of the light that ever streams from the chandelier of nature; they are the handiwork of perfect genius.

Objects appeal to us as being beautiful because the ideas, thoughts and feelings they arouse or elicit are akin to the thing; because the thoughts, the feelings, and the things are alike the product of kindred forces, are governed by common laws, and are cast in eternal kindred molds.

A SPECIAL VITAL CORPUSCLE

Is there in nature a special and peculiar atom or corpuscle with which the vital force is connected or involved, or is the vital force connected or associated with the ordinarily recognized coarse atom or molecule, and a manifestation of one or more of the forms of its atomic or molecular activity?

Of the essential nature of energy we know nothing. It is only in its manifestations, only in some character of motion, that we can in any degree comprehend it. Furthermore, its manifestations can all be traced back to motion in some form of ponderable material substance. Nor does it halt or rest when once set in motion in the form of ether waves until it impinges on or collides with some other such ponderable material elements. We may therefore safely maintain that the primal manifestation of energy is in the vibration of some form of ponderable atoms or corpuscles, even though at the present time science is tracing these bodies themselves to that refined condition in which matter and energy become one. The conditions of organic life, however, do not seem to be fully satisfied, as before indicated, except on the supposition that there exists in nature a vast store of a peculiar class of refined particles which might be denominated vital atoms or corpuscles and whose associated force might be denominated vital force or soul-stuff.

SEX AMONG CORPUSCLES

When we consider the constant proportion and the practical equality existing in the number of individuals of the different sexes among animals and plants, in all ages

and in all countries, it is not easy to avoid the conclusion that the refined atoms here assumed and their associated force are endowed with sexual characteristics: that is to say, endowed with tendencies which enable them when entering into the formation of new individuals to direct and determine the development of one or other of the sexes. If it could be established that there exists in nature a practically unlimited store of vital atoms or corpuscles in equal number, male and female, and that in order to be able to unite or combine and form a new individual, these corpuscles must combine in unequal numbers, that the majority in each combining group determines the sex, so that when the majority in a particular combination happens to be male, the resulting individual will be male, but that in such individual the female atoms constituting the minority will produce the female rudimentary organs found in the male, that when the majority happens to be female, the resulting individual will be female, but that the male minority in it will produce the rudimentary male organs, we should have at the same time an explanation of the virtual equality of the two sexes as regards numbers and of the presence in both sexes, of crossed rudimentary structures.

Thus when a male should be produced, there would be a disturbance of the balance of forces in the life-giving elements of nature, and the chances in the next turn would favor the production of a female; and conversely when a female should have been produced. If, in some instances, as in the case of hemp among plants and bees among insects for example, one or the other sex is found greatly to predominate in number, it might be suspected that there had been to a greater or less extent a failure of fecundation on the part of the sex thus deficient or a defect in some other of the steps of reproduction.

IS ALL EXPRESSION OF ENERGY VIBRATORY?

In order to establish the probability of the contention that mental and other psychical activities, and the activities resulting in physical forms as well, are uniformly vibratory in character, it is of the greatest importance to demonstrate that vibrations either manifest or implicit, constitute all the known forms of the manifestation or expression of energy.

Force has been defined as the tendency of energy to transform itself, and also more simply, as that which produces motion or pressure. The rule for the employment of the terms, force and energy, has for some time, among scientific authorities, been undergoing a change, the tendency being to narrow the scope of meaning of the term, force. There is still, however, more or less confusion in the popular mind as to the employment of these terms. But employing the term force as expressing a manifestation of energy, it is now universally regarded as embracing every mode of motion.

By the most advanced thinkers, all energy is now regarded as one and the same thing in the final analysis, and all manifestations of the common energy, that is to say, all forms of force are held to be interchangeable. Furthermore, it is not unreasonable to contend that while energy is in its essence inconceivable, all of its known manifestations may ultimately be resolved into vibrations.

On the first presentation of the theory whose development is here attempted, now more than forty years ago, the author reached the conclusion that all force is either actually vibratory or else resolvable into vibrations. This conclusion was based upon two considerations. The first consideration was that of the necessity of vibration as

a result of the equality of action and reaction; and the other was based upon the fact that forms of force known to be vibratory can be changed into forms apparently not vibratory; and conversely, that forms of force not yet ascertained to be vibratory can be transformed into others that are wholly vibratory.

Long pondering of the first consideration has not increased the appreciation of its forcefulness, while the second grows stronger the more it is investigated and considered. Since forms of force or modes of motion in which it is difficult or apparently impossible to trace vibrations, are found invariably changeable into others that are distinctly vibratory, it is a most reasonable conclusion that the vibrations existed potentially at least, in the force to be translated, before the translation was effected.

On the contrary, when a form of force that is wholly vibratory is changed into one in which all evidence or appearance of vibration is seemingly lost, it is difficult to resist the conclusion that the vibrations still exist somehow involved or implicated in the new mode of motion, especially when this can be again changed into the vibratory form.

Thus a cannon ball moving through the air, or a planet moving through space does not in the least suggest vibration. But let either experience a resistance that shall entirely arrest its progress, and the mass motion is all at once and completely transformed into molecular motion: that is, into heat, light, or some other form of energy that is wholly vibratory. And here too the conclusion is a most rational one, that the resulting molecular vibrations have been all the time completely involved or implicated in the previous mass motion.

When the powder in a cannon is exploded, the chemical energy of its elements, not demonstrably vibratory in that

form, takes the form of heat, which by its wide range of vibrations drives the particles of the resulting gases apart and propels the ball from the cannon and on through space.

Here the vibrations which constituted the heat have become the mass motion of the ball, and are seemingly lost or disappear. But when the ball strikes the armor of a ship, or other rigid substance, some of its molecules are driven too close together, and then springing apart they begin swinging back and forth, and thus revive the fine or molecular vibrations which had been absorbed into the motion of the ball as it was leaving the cannon. There are also other parts of the ball at the sides, which are arrested before reaching the ship's armor, so that the cohesion of the atoms at those points is strained by their momentum or tendency to move on; and then being made to spring back by cohesive force, they are set to vibrating it may be rapidly enough to give off light.

Or we may conceive a more easily intelligible illustration of this transformation of mass motion and the converse. Let a dozen billiard balls be suspended as pendulum balls in a row, and then set to swinging. At their phase of greatest speed let them strike all at once and with a force equal to their momentum, a bar which after moving through a distance of one foot shall also strike all at once a second row of balls of equal weight with the others. On the instant the first row of balls will come to rest, while the second row will be set to vibrating just as the first had been, assuming that there was no loss of energy by the production of heat or by rebound in the collision. But the bar while moving was seemingly not vibrating, and might have gone on so forever.

Just as the bar takes up the vibrations, and while itself apparently not vibrating delivers these vibrations to the other balls, so the cannon ball takes up the vibrations due

to the explosion of the powder, these vibrations to become its mass motion and to be given out again as fine vibrations of light or heat, in case of an arresting collision.

Not all the vibrations, however, of the exploding powder are taken up, but only those whose simultaneous excursions are taking place in the direction of the cannon's mouth. The first swing of the atoms in that direction becomes the motion of the mass. And in order to become the motion of the mass, the vibration of the particles had to be arrested when only a single excursion or half a period had been completed. The other half of the vibration periods would be completed and that in molecular form, when the ball should strike the armor of a ship or other mass that might arrest its motion, or never if its motion was never arrested. In the mass motion of the ball is therefore hidden away every heat and every light vibration that shall be developed when it is arrested at the end of its journey.

Still another and perhaps more apt illustration of the manner in which molecular motion or vibration may be transformed into mass motion is offered by the conception of a large number of balls fastened together in a bunch by means of elastic cords, and all set to vibrating in such a way that no ball moves in any direction, without having its motion counteracted by that of another ball moving at the same time in an opposite direction.

Under such conditions, if all the balls should move with equal force and frequency, the whole mass would remain stationary in one position. But if all the balls should begin an excursion in the same direction and at the same moment of time, the whole mass would move away in the direction of such motion with what would be the average speed of all the balls, while the individual vibrations of all the balls would disappear.

So if the molecules or atoms of a mass of matter heated to a white heat throughout, could all enter upon an excursion at the same moment of time and in the same direction, the mass itself would move away with the speed of light, at the same time becoming dark and cold.

IS GRAVITATION VIBRATORY?

While it may not be quite essential to the validity of the theory of the origin of life and form, both of mind and body here sought to be established, that gravitation be proved to be vibratory, and that gravity is a repulsion and not an attraction; it would certainly strengthen a vibratory theory of mind and form, if we could establish the probability that all other known expression of energy is vibratory.

In order to sustain a theory of gravity by repulsion, it would be necessary to make a number of assumptions, some of which might be regarded as violent to a degree. These assumptions are:—

First: That from every existing gravitating atom, there are continuously and perpetually radiated into the ether at all temperatures, waves or vibrations more rapid and of narrower range than any yet perceived; and further that these vibrations pass through solid substances as readily as or more readily than through the ether.

Second: That these vibrations are resisted by the ether, upon which they exert pressure, and this pressure reacting upon the mass that is emitting the vibrations tends to push it off in the opposite direction.

The result of all this would be that if a mass were placed anywhere in space, perfectly isolated and stationary, it would remain absolutely still in its position, reacting equally in every direction against the ether. But if another body should be brought into the field of its vibrations,

the ether in the space between the two bodies, especially along the line passing through their centers and indefinitely beyond, would be kept in rhythmic vibration by each body for the other. The vibrations radiating from such bodies on their near sides at all oblique angles would consequently meet with less resistance on the part of the ether than those radiating in the same manner from the opposite or farther sides.

The result of this would be that the ether in the field of the radiations of the nearer sides would be better prepared for facilitating wave passage than that of the farther or more remote sides, and thus the two bodies would be driven toward each other by the unequal reaction of their near and far sides against the ether.

Some of the hypotheses here invoked find a colorable support in present day science. A German scientist some years ago gave out a report detailing a large number of experiments carried out by dropping wooden balls into a vessel of water. When the balls were of the same size and dropped at the same instant into the water, their tendency was to move toward each other. But when dropped at different times, or when the balls were of different sizes, they tended to move away from each other.

This would seem to indicate that when the water was already in undulation from the action of one ball, the waves passing through it from the other met with less resistance than the waves passing outward toward the walls of the vessel. The reaction impulse being therefore less between the balls than between them and the walls, they were driven together. It is also said that two tuning forks suspended on cords near together and vibrating in unison tend to approach each other.

It is a well-known fact that light and other radiant vibrations meet with resistance on entering the ether, and

it necessarily results that the impact of such vibrations against the ether react against the luminous bodies from which they proceed. It follows then that if a sun were placed stationary and still in space and one-half of it should become cold and dark, leaving the other half unchanged, the luminous half would in the course of millenniums be found chasing the dark half through the universe with something like half the speed of light.

The impact of sound vibrations has also been proved to exert pressure upon the surrounding air, and this pressure also has been weighed, and as might have been expected, has been found to decrease with the square of the distance from the source. This resistance to the impact of sound must necessarily react against the object giving it off.

It is obvious that if a force or pressure is exerted by radiating vibrations, against the ether as they proceed outward, an equal pressure of reaction must be exerted upon the body that gives off the radiations. In the case of gravity vibrations the proportion of radiation would be vastly greater than in the case of light, and the reaction would be correspondingly greater, for under the hypotheses every atom of a mass gives off gravity vibrations which pass through the whole mass without hindrance; whereas only the surface of bodies can give off light vibrations.

But the most violent hypothesis connected with such a theory is that matter at all temperatures is constantly giving off the exceeding short and rapid vibrations that the gravity vibrations are supposed to be. Formerly this seemed to be a fatal objection. But the discovery of radium and the fact of its giving off various kinds of vibrations at the very lowest known temperatures, has furnished an example that affords at least the suggestion of an analogy that adds something to the probability of the contention here made. But the greatest difficulty

is the one that attends every attempt to conceive the source of gravitational energy. Whence is the energy supplied that is eternally and seemingly inexhaustibly dispensed by gravitation, this mother of all the force manifestations in the universe?

As said before, we have as yet no hint of any method or process by which energy can be exalted; or by which dissipated heat and other degraded forms of energy can be again elevated to the grade of gravitational energy from which they originally sprang, and thus the cycle be completed. Gravity is transformable into all other forms of the natural or common force, and is continuously being drawn upon, throughout the universe, to produce them; therefore they must somewhere, sometime and in some way be transformed again into the energy of gravity. Can it be that such a process is in some way related to the principle that inertia increases at a greater rate than speed, and that this applies to the speed of waves traversing the ether? Or is the process based on some as yet unknown property of the ether waves?

It may not be indispensable to a theory of life and form based on vibration that gravitation together with all other manifestations of energy should be proven vibratory, but a demonstration of that character would vastly strengthen such a theory.

The chief aim in the foregoing investigation into the nature of energy and force has been to lead up to a just understanding of the characteristics and extent of vibratory or undulatory motion, and that with the special view of showing either directly or by analogy that all manifestations of energy as related to life and form are either actually or potentially vibratory; for it is on this assumption that it is here proposed to base some of the most

involved, most intricate and most important of all the problems of mind.

SOFTENING OF WAVES BY TIME AND DISTANCE

There remains, however, a further and most important assumption to be established, namely, that it is characteristic of all forms of undulatory or vibratory motion that with time and distance they increase in amplitude while they diminish in intensity; or at all events that by reason of diffusion or some other means, a progressive mildness, softness, or gentleness is impressed upon the undulations of radiant energy, and all other waves, as well, by lapse of time or the traversing of space.

The increasing length and the diminishing violence of the waves of water, as they travel from their exciting cause, is easy to observe on any considerable body of that liquid when its surface is disturbed. The observer of a passing steamer will perceive that just behind the wheels the waves run high with sharp crests, and that they follow each other closely. As they recede farther from the boat or are left behind they become longer and slower, and before finally disappearing, they are changed into gentle swells with their crests widely separated.

A similar condition has been found to obtain with the tremors or shocks of earthquakes. Near the locality of disturbance the vibrations are found to be rapid, tumultuous, violent, and discordant; but farther away they become more regular, fewer for a given time, more harmonious and greatly softened in their intensity. But while in the case of waves of water and earthquake tremors the increase in horizontal amplitude is easily observed to keep pace with diminution in intensity, this is not so easily made out in the case of waves of sound.

SOFTENING OF SOUND WAVES

As in the case of light, the wave length of sound, it is claimed by most authorities, is neither increased nor diminished by length of travel, since the pitch which depends on the vibration frequency remains the same whatever the distance at which the sound may be heard. That is, the distance over which a sound wave will pass in a given time is held to be constant for the same medium at the same temperature.

However there are those that hold that pitch is lowered with distance, which, if true, would indicate that a part of the waves of sound are merged during its progress. In large caves returning echoes have been observed to be of a distinctly lower pitch than the primary sound, a parallel to which is found in the case of reflected light.

In the case of sound waves, we are taught that the long vibrations travel faster than the short ones, so that a loud sound which consists of long vibrations, will travel faster than a low one which consists of short vibrations. So much is this the case that in polar regions, the report of a gun may be heard by a distant listener, and after that the command of the officer to fire. The length of sound waves is also diminished while passing from a rarer medium into a denser one.

But in all this we have found no certain criterion by which we may form a definite estimate of the distance a sound wave may have traveled before reaching our ears. What then can there be in the behavior of sound that enables us to judge whether it comes from a point nearby or one that is farther away? If sound waves do not grow longer and milder with distance traveled, if there is not a progressive diminution of intensity, it might yet be that

there is a change in the quality of sound that to some extent indicates the stages of its journey.

Quality is the name given to the impression made on the ear by a sound with regard to its various degrees of complexity. And, as already indicated, there is no doubt that sound waves become less complex and more orderly and harmonious with distance, as do earthquake vibrations and other like tremors. This goes to prove that, in these cases at least, quality bears a relation to distance of travel.

Again, alterations of pressure or impact of the sound wave diminishing with the distance traveled may be the factor sought, or at least may contribute to the effect. Recently delicate balances have been constructed for weighing the force of the impact of the waves of sound after the pattern of Tyndall's balances for weighing the force of the impact of light. In this way it has been ascertained that the sound impact decreases with distance, and its force is probably inversely as the square of the distance. This progressively diminishing force of impact might be of service in efforts at discerning the distance traveled by the sound, if only we had a correct notion of the strength of the sound when it started. This would be somewhat analogous to perspective in vision.

But whatever the view that now may be held, or whatever future investigations may reveal, every one knows that there is a peculiar quality to sound that enables him to form some notion, for the most part a fairly correct one, of the distance a sound has traveled before reaching his ear. Furthermore, this peculiar quality can to a certain extent be voluntarily imitated, so that the sound of the voice may be made to seem to have come from a much greater distance than is actually the case.

One who has listened to the hunter's horn or the baying of the hounds in the chase, is aware that independently of

any lengthening or shortening of the waves of sound that may be due to the approach or recession of its cause, he can form a fairly correct judgment as to whether the chase approaches or moves farther away. Likewise in hearing of the battlefield, where each gun contributes its share of the noise almost instantaneously, and the length of the wave is therefore unaffected by any movement of the gun while the sound is in the making, the listener may easily, from his distant station, perceive who it is that advances and who retreats; where rests the promise of victory and where the omen of defeat.

SOFTENING OF LIGHT WAVES

A theory of mind and form based on vibration would seem however to depend mostly on the behavior of the waves of light, and it must be confessed that this support is far from being strong enough to force conviction on unwilling minds.

Waves of light in some respects resemble those of water in that they are transverse, and that they both consist of a portion raised above the normal level and called a crest, and a portion depressed below it, called the trough. They resemble sound waves in that both are supposed to travel indefinitely with the same wave-length and frequency through a medium of uniform density.

But while the speed of the waves of sound vary with the wave-length, the speed in vacuo of all light waves is believed to be the same regardless of the wave-length. If this were not so, in as much as light of different wave-lengths is different in color, an eclipsed body, one of the satellites of Jupiter, for example, on reappearing from behind a planet after an eclipse would be seen first of the color which travels fastest, the others subsequently

appearing. Nothing of this sort having been observed, the inference is that all light waves have the same speed whatever their length.

If the waves of light traversing the ether should increase steadily in length and decrease in rapidity, so that violet should become orange in the course of its journey, and ultimately red, then the remotest visible stars should all appear red; for this is the color through which they all must pass, being the last one they exhibit before disappearing from vision.

The light, therefore, that left the remotest stars, it may be thousands of years ago, as infra red, the slowest of the ether waves the eye can perceive, has all this time, it would seem, been traveling with a vibration frequency of 395 million millions per second. Likewise the violet, the most rapid that can impress the eye as light, has all that time kept the pace of 760 million millions per second. Is there then no length of journey in all infinity, the end of which the waves of light reach travel-worn? Without the least slackening of their pace do they go on and on forever? Through the pure ether, yes, as far as we yet can know.

But when entangled with ponderable matter there come often and under many conditions changes in the waves of light; and these changes are perhaps in all cases a transforming or combining of shorter waves into longer ones. Thus the ultra violet waves which traverse the ether of space with a vibration frequency of 833 million millions per second, if made to pass through a solution of quinine or kerosene, will emerge as blue or violet having lost a large part of their wave frequency. So in passing through various other substances waves of this class may emerge with still other frequencies; or, yet again, when taken up by various phosphorescent substances, they may be given out again with the whole category of such waves as affect

vision. That is, they reappear as white light, the higher frequencies of some of the waves having been acquired through the degradation of others.

It is not impossible, even, that the condition of elevated temperature recently ascertained to prevail in the upper regions of the air is due to the absorption of the weakened rays of light coming from the stars; and certain it is that heat and light are so degraded by reflection at the earth's surface that they are absorbed by the atmosphere in increased proportion. Likewise heat rays from the sun will pass directly through glass, but cannot then pass back again by radiation after having experienced reflection from the surfaces beneath.

Since the color of light depends upon the wave length, which appears not to change with distance of travel, and its speed depends upon the constitution of the ether, as is proved by the fact that the rate of speed is the same for all lengths of wave whether of light, heat or electricity, it must be admitted that the view that a change in either of these respects comes to the waves of light while journeying through the infinite ether, a view that would be most helpful to our contention if shown to be true, is not very strongly sustained, analogy being its main dependence for support.

It is certain, however, that whether or not the wave of light ever varies in either speed or length while journeying through the ether, light as it recedes from its source must be progressively weakened by diffusion. The energy of light like that of gravity must decrease with the square of the distance from the luminous body, and the force of the impact of light must decrease in a corresponding ratio from diffusion alone. And as we have seen, the quality of light is greatly affected by reflection.

And since it is known that waves of water and earth

tremors give distinct evidence of the distance they may have traveled, and sound waves assume a character that is scarcely less indicative, although it equally fails to be shown that sounds change their character with any relation to the distance they may have traveled, it may possibly yet be demonstrated that light also comes from far away sources, with some acquired quality or property that enables our judgment, acting it may be all unconsciously, to recognize the fact that it is travel-worn, and to form a dim estimate of the distance it has traveled.

Yet even if this is not the case, even if the pace of light through the pure ether is forever the same, there yet remains the possibility that in traversing the atmosphere, either primarily or after being reflected back from the earth's surface, it may take on a character akin to the water wave, or the sound effect. And it is more than possible that if we had a power of perception for light as much more refined than that which we have for sound, as light itself is more refined than sound, we might readily perceive an altered behavior due to the modifying effect of distance or length of travel.

And after all it is not absolutely essential to the validity of the argument to prove that radiant vibrations do in fact increase in gentleness and softness as they journey through space. This, however, would make more probable the assumption that memory consists of vibrations, and that memory waves decrease in intensity with time and that they differ among themselves in intensity and amplitude at any given moment.

If this be true of memory waves—it they do in fact differ among themselves in intensity, and those are the gentlest and most harmonious that have existed longest in the neurons—the requisite conditions are met; if it can also be shown that light and other radiant waves vary in intensity,

such fact will lend strength to the theory, whether or not they become progressively gentler and softer as they traverse space.

Under such conditions it is not indispensable that such slowing take place. It only needs that the gentler vibrations of radiant energy, and the gentler vibrations into which sound and other sense-impressing forces may be decomposed and translated in the brain, shall combine with the gentler vibrations that enter into the constitution of memory and awaken them to a recognition by consciousness.

RESUME'

As a recapitulation of the points so far suggested or contended for in our discussion, as the basis of a theory of mind and form, the following may be designated as the principal.

First: All energy expresses itself in vibrations either actual or implicit.

Second: The natural or inherent tendency of these vibrations is to form figured groups, to enter into definite arrangement, and also to produce definite orderly forms when acting on ponderable particles.

Third: The tendency of all classes of vibrations or waves, when passing through space or enduring through time is to become more simple, mild, and gentle.

THE BRAIN AND ITS ACTIVITIES

Having thus attempted to set forth in a brief way the nature and extent of the involvement of vibration in various manifestations of the common force, we may now proceed to consider the nature of mental or brain activities, with a

view of ascertaining the analogy that may exist between them and the forms which external nature tends to take on and produce. And since the principal and most important of these are thought forms, it may prove helpful to enter into a brief consideration of the structure and functions of the brain, insofar as may be necessary to serve the purpose of our investigation.

The brain, or that part of the cerebro-spinal nervous system immediately concerned in conscious intellectual activity, consists of three principal divisions, independent of one another, and yet very intimately bound together. These divisions are the cerebrum, the cerebellum and medulla. Of these the cerebrum alone is believed to be the seat of conscious thought in man; and for the purposes of this inquiry the others need be no further considered.

The cerebrum or forebrain consists of two lobes or hemispheres, the one in every respect and almost exactly the counterpart of the other. They are connected with one another by a great quantity of white fibres, or tubules, which pass from every part in each hemisphere to the like part in the other, so that the two lobes constitute a veritable twin system. Each cerebral lobe consists of masses of gray matter and closely laid bands of connecting white fibres or tubules.

The masses of gray matter are composed of vast numbers of cells called neurons which are situated in the outer surface of the brain, and arranged in the form of a thin layer that constitutes the cortex. In the cerebral portion of these lobes or hemispheres are other cells, arranged in the form of two gray ganglia or masses, one on each side. These are coupled together by continuations of gray matter, and form the gray substance of the optic thalamus and corpus striatum.

The white substance which consists mainly of nerve

tubules, fills the space between the outer gray mass which forms the surface of the brain, and the mass of gray cells of the central ganglions. These white fibres radiate like the spokes of a wheel from the gray matter of the central ganglions to that of the brain surface, and partly pass across from one hemisphere to the other, connecting like parts of the two halves of the brain, and partly pass out to the general bodily system to carry motor impulses or to bring back sensations.

This system of white fibres or tubules offers a curious resemblance in plan of structure to insulated telegraph wires or cables. Thus there is in each tubule first a central filament of albuminoid material, whose office is to conduct nerve force and which corresponds to the central copper wire or coil in a cable. Around this is a layer of fatty substance called the white substance of Schwann, which is a non-conductor of nerve force, and corresponds to the non-conducting sheathing of the electric cable or insulated wire. Still outside of this is a protective sheath of modified connective tissue called the neurilemma, and answering to the outer protecting sheath of the cable.

Each of these fibers or tubules, as it proceeds from the neuron with which it is continuous, sends out a greater or less number of branches, on the whole bearing a fairly close resemblance to a tree and its branches, and for this reason called a dendron.

The nerve tubule constituting the trunk of this dendron may enter another neuron than the one from which it springs, and thus become continuous with two or possibly more neurons. But in the vast majority of instances, the dendron is continuous with only a single cell or neuron, its branches merely twining about other neurons and conducting away at proper times a charge of nerve force, or conveying to them stimuli or impressions from without.

At and near the surface of the brain, the neurons of which the gray matter consists are smallest, getting larger towards the central portions of it. The larger neurons which have the more regular shape, have prolongations reaching out from them, which become continuous with the central axis-cylinder of the white nerve tubules. Of these branching prolongations or dendrons, some of the larger neurons have as many as seven or eight; others have but one or two, while many of the smaller ones have none. Curiously enough these smaller neurons will on occasion project prolongations of their own substance, as a leukocyte might do, to form connecting filaments of communication between themselves and neighboring neurons.

OPTIC THALAMUS AND CORPUS STRIATUM

The optic thalami constitute a pair of large ovoid masses of grayish matter situated almost exactly in the centre of the brain. Each consists of ganglions or enlargements ranged one below the other, and two slender bands of gray matter extending down to and being continuous with the gray matter of the spinal cord. These ganglions of the optic thalami receive connecting filaments from all directions, both from the cerebrum and the cerebellum on one side, and from the general system through the medulla on the other.

Throughout the gray matter of the surface of the brain are located areas devoted to special tasks; and it seems to be the function of the optic thalamus, besides transmitting impressions generally, to sort out such impressions as are to be separately recorded in the brain, and to direct them to the proper location. Indeed the optic thalamus appears to be a kind of clearing-house or switchboard, the receiving and distributing point for the entire nervous system.

The corpora striata constitute a pair of ganglions just in front of the optic thalami, made up largely of a core of gray matter and connected with the motor nervous system in much the same way as the optic thalamus is with the sensory system. Through it as a gateway, pass outward most of the motor nerve fibers or tubules that carry nerve impulses from the brain to the rest of the body.

FUNCTIONS OF NEURONS AND AXONS

Various and diversified as are the neurons and axons in their structure, in function they are apparently still more complex. Especially is this true of the neurons.

Of the cortical cells, or those on the outside of the cerebral hemispheres, it is known that some are engaged in the elaboration of motor impulses, some in the production of electric currents, others nerve force, and still others, thought. Doubtless, could we ever attain to a full knowledge of all the diversified work that is performed in the various cells of the brain, we should find it only less than infinitely complex and infinitely differentiated.

As already indicated, it is highly probable that one of the principal offices performed by the optic thalamus, is the receiving of sensory impressions from all parts of the body, and sorting them out and distributing them to the various cells of the cerebrum to which they appertain. But the first selection and assorting of impressions is effected by numbers of little bulbs or corpuscles placed at the distal extremities of the nerve fibers, and called variously, corpuscles of Pacini, tactile corpuscles of Messier, and end bulbs of Krause, after their several discoverers.

It is fairly well established that these end-organs select from the impact of force exerted on the nerve endings, such sense vibrations as by their structure and function

they are capable of receiving and conveying. Thus some of them will select and conduct sensations of heat, others of cold, others of pain, and still others sensations of qualities that are revealed as taste. There are others that make still more subtle distinctions, until it would seem that scarcely two nerve tubules in the entire body bring the same kind of report from without to the brain. As these impressions brought in from the external world reach the optic thalamus, they are still further sorted out and directed to their appropriate location in the cerebrum, cerebellum, or whatever point the proper location may be.

The corpus striatum has for its office the sending out of motor impulses that are received from the cortex or other gray matter to the various muscles whose movements they control or direct, and probably they assist in maintaining the harmony of development and the nutrition of various tissues and organs. It may be justly said, however that so much remains to be accounted for in the complex processes of the system that all that is known seems but a beginning.

Hitherto no connections have been made out between the distal extremities of the trophic axons and the motor axons which carry the outward current of nerve force, on the one hand, and the sensory axons, which carry the return nerve current on the other. Indeed, up to the present time, no conductor of nerve force, other than the nerve itself has been discovered, and hence no instrument has been contrived for its exact measurement, except as to its speed.

It is certain, however, that an electric current is continuously flowing outward along the motor axons, and another coming in along the sensory axons. Now since this electric current must complete its circuit through the tissues between the extremities of the nerves, it is rendered highly

probable that the same may be the case with the nerve current. Furthermore, it seems more than likely that as long as life lasts, the circuit for the nerve force is completed by the tissues located between the distal extremities of the motor and sensory nerves, and also that a current of nerve force, however faint or gentle, is continuously making the rounds of every nerve circuit thus formed, whether it be within the brain or within the general system as a whole.

The conditions of thought would seem to demand such a continuous current, since if it were wanting, it would involve the over-coming of a greater or less amount of inertia or the expenditure of force in opening the way, every time an impulse was to be sent along a nerve. The presence of a constant current would render the conditions somewhat similar to the further turning up of a gas jet already lighted, or grasping a cable already in motion for propelling cars.

With the aid of this imperfect description of the structure and functions of that part of the brain which principally constitutes the field of mental activities, or the stage upon which the imagination may watch the play of the wonderful actors in the drama of thought, and utilizing the principles set forth in the preliminary discussion, we may now proceed to ascertain, if this be possible, in what way and in what form mental impressions are made and retained in the neurons, and in what manner they are from time to time brought into consciousness. We shall also endeavor to obtain an intelligible notion of the appearance of memory or the contents of mind in all of its most important relations.

It is not altogether prudent, however, to ignore the part probably played in mentation by the nerves of the sympathetic or vegetative system, and more especially the

part they play in the direction and control of the processes of growth and repair.

The deep and strong emotions, whether painful or pleasant, are very prone to make themselves felt in the region of the coeliac axis or "abdominal brain" as it has been called and not inappropriately. The terms "heart-ache" "heart-sick" "bowels of compassion" and the like, are very suggestive of recognition of an active part as played in the matter of the expression of strong emotion at least, by the ganglions of the sympathetic nervous system. Indeed it is possible that quite an extensive role is played by the sympathetic in the department of subconscious mental activities, as well as in the effectuation of digestion, assimilation and nutrition and various other physiological functions.

There is, however, a great number of such wonderful processes carried on in connection with the vital functions of organisms both animal and vegetable, that seem subject to a deeper source of control than even the sympathetic system. The wonderful provision of opsonins in the blood which render phagocytosis effective, and various other contributions to vital processes, seem to have their source in the white cells of the blood. But these cells must derive their powers from a source still antecedent to themselves, and this remote source may well be the vital corpuscles or electrons in which is supposed to inhere the initial principle of life.

The muscular tissue also, as will be mentioned again later on, may take a shadowy part in the production of thought and other elements of mentation. How could the muscles reveal to the nerves their sense of fatigue, their degree of strain and their craving for activity, if they had not some form of consciousness and some faculty akin to thought and its expression?

THEORY OF MEMORY

Memory has been very satisfactorily defined as the faculty of the mind by which it retains the knowledge of previous thought or events. This faculty may manifest itself in at least three different forms.

First: In the persistence in consciousness of impressions made upon the mind, or by the spontaneous recurrence of such impressions, when it is called remembrance.

Second: In the recall of such impressions by distinct effort, when it is called recollection.

Third: In a form intermediate between these two, by a conscious process of recalling past occurrences, but without full and varied reference to particular things, when it is called reminiscence.

In this discussion, however, it is not proposed to restrict the term "memory" merely to the retaining or recalling of previous thoughts or impressions or other product of brain activity, but also to embrace the method or mechanism of their retention and reproduction or reappearance in consciousness.

The undertaking in view is, in fact, an endeavor to set forth a theory of mind and life as a department of philosophy, based on the tendency of interacting vibrations toward the production of definite forms, whether of thoughts or things.

In the fullest sense then, memory may be regarded as the persistence in the neurons, if not elsewhere among the organs and tissues of the body, of every character of accumulated sensation or perception, whether in the form of ideas, emotions or other content of mind, together with their susceptibility of being aroused from time to time in such a way as to be recognized in consciousness. This recognition

of recalled experiences may take on the distinct form of ideas, emotions and the like, or that of indefinite modification in various ways and in various degrees, of the existing store of thought or feeling.

In the endeavor to explain memory, as found in living organisms in the light of the foregoing principles, we may take notice of certain phenomena that have been compared to it by way of illustration, and to which it has been supposed to manifest a similarity suggestive of some as yet little understood relation.

Thus some investigators have thought to find analogies for memory in the inorganic world, or at least in the accidents of dead matter; and particularly in a certain susceptibility of light vibrations, whereby they may be stored on sheets of paper or other material, and there preserved for longer or shorter periods of time, in the form of latent vibrations, to reappear at the summons of various developing agents.

If, for instance, engravings be laid on sheets of paper or linen and the two kept together in a dark place, after having first been exposed to the sun's action, the sheets can months afterward, by the aid of appropriate reagents, be made to yield persistent traces of the sun's action upon their surfaces. Similarly if a key or other like object be laid upon a sheet of white paper and the two be exposed to the direct rays of the sun, and then the paper be laid away in a darkened place, years after, the spectral image of the key will still be visible.

It is a widely prevalent notion, even among leading authorities, that in some such way as this, images are imprinted and preserved in the neurons; these authorities having apparently overlooked the fact that ideas must be made up of elements derived through the hearing, touch, taste, smell, and other senses, as well as through sight.

The examples just given, however, suggest but a single element of memory, namely: the retention and ultimate release of visual impressions alone, and that too in only a passive state.

There is in these examples, as already intimated, no suggestion of impressions derived from the senses other than sight, and that too only in the form of a fixed visual image. The persistent inter-association, the incessant active changes, the endless disappearance and reappearance that characterize the content of memory derived from reports of all the senses, find here no parallel.

The light given off by a photograph or a picture is not the result of its own proper activity, but is simply a reflected light, and the only effect of a photograph or a picture is to alter the arrangement of the rays of light which it gives out by reflection. If ideas and other more complex mental images are simply photographs, simply lifeless images or pictures, how are they ever to be awakened into renewed activity? Above all how are they to awaken each other as they are perpetually doing?

Throughout all the waking hours of life and often in sleep, from moment to moment there spring up and move on in the brain, vivid and persistent trains of thought or extended and far-ranging reveries, with the senses practically closed to all excitations from without. With endless persistence and variety, sensations, ideas and emotions are unceasingly woven in numberless patterns in the untiring, self-driven and self-directed loom of fancy.

By no possibility could mere lifeless pictures disport themselves in such a way. They might be piled mountain high, they might be strung or jumbled or arranged in whatever form, but there they would continue to slumber. They could no more arouse each other, nor awake themselves, than could the lifeless plates upon which they may

have been impressed. For even though it might be that the dead can bury their dead, we may rest in the fullest assurance that the dead can never wake their dead.

MEMORY AN ACTIVE PROCESS

That which produces in the mind images or representations of external things, and that which perpetuates its content in an active form must, therefore, consist of elements embracing some active form of energy. It must be constantly producing and giving off some form of vibrations, and not merely reflecting in a passive way undulatory emanations derived from either internal or external sources.

The energy producing mental activities must be developed either in the neurons, or in the blood and then conveyed to the neurons. In the plant the energy of growth and of whatever living function is performed can be developed only in its albuminoid protoplasm, and this by analogy would place the laboratory of energy in animals in the white cells of the blood. A retrograde metamorphosis taking place either in the blood plasma primarily, or in the blood cells into which the plasma has been transformed, must supply the dynamic agency of all thought and all thought products. That is to say, such retrograde metamorphosis or destructive changes of food elements must supply the motive power.

But then there must be present in the neurons a material ponderable element upon which the energy so developed can act, even though we trace matter, in the light of recent teachings, to a state in which energy and matter seem to merge into one substance. Though energy travels through all space, we cannot conceive of it as remaining stationary in space and vibrating independently of material or pon-

derable substance. Energy begins with ponderable matter and ends with or extends to ponderable matter, and in that attitude alone can we conceive it. That is not a wave which does not travel.

Since the most vivid and lively sensations have always been those of sight, men early drifted into the impression that all thought forms resulting from the activities of the neurons take on the character of visual pictures, and hence such forms came to be called ideas. But this evidently cannot be the case any more than that ideas consist of forms derived exclusively from sensations of taste, hearing, smell, or touch, though we might be little able to conceive the appearance these latter structures might assume in the brain.

The only state in which the reports of all the special and internal senses can be brought together in one class, is in the guise of vibrations operating together to form figured groups, or groups in the form of figures. It would seem that all characters of sense impressions must be translated into interacting vibrations.

However, there is no evidence and no good reason to believe that a form which in the brain constitutes the idea of an object, bears any direct resemblance to the picture of such object. All the senses working together set up in the neurons, orderly vibrations that may eventually present an aspect of unity, which is the so-called idea or other thought product. If ideas are made up of parts even though these parts consist of no more than an orderly movement of force impulses, they must have position with reference to one another, and therefore, the image that impresses consciousness will present the same arrangement as to shape or form, from whichever of the senses it may be derived.

CONSTITUTION OF IDEAS

In what way then, can these images called ideas be constructed and perpetuated? That they can exist as pure force independent of the support of material or ponderable elements, as already indicated, we cannot conceive. As said before, we have no experience or conception of the operation of force, except as proceeding from or in some way connected with ponderable matter; nor can we form any conception of such a thing. That ideas and their modified combinations could consist of an orderly arrangement of molecules, taking the shape of visual or other sense images, is scarcely more intelligible, or apparently less impossible. The number of forms or corpuscles and images required for the effectuation of memory, must be too great for them to consist altogether of material structures.

It is much more consonant with the known facts of natural science to suppose that certain atoms or corpuscles that enter into the structure of the neurons, possibly differing in character from anything the laboratory has yet revealed, modify by various processes of refraction or reflection, the forces playing on them, or passing through them so as to give these forces definite groupings or definite forms.

These constantly operating forces or streams of force are supposed to play in definite paths, somewhat in the same manner as the forces that arrange iron filings into figures in the magnetic field, the molecules of water in forming snowflakes and frost flowers, or such as direct the deflected pendulum in the formation of Lissajou's figures. And here it would seem that photographic resemblance as to form might possess some application.

Experience teaches that as a general rule, the oftener an impression is repeated, the more tenaciously it is retained. This would render it more than probable that the groups of material or ponderable corpuscles which are supposed to function in the neurons, and direct the streams of force moving through the brain, compelling these streams to assume thought-forms, become more and more stable and uniform in proportion as they are the longer acting or acted upon in one connection, and more stable and uniform with the lapse of time, in whatever way such uniformity and stability is produced.

If the case were otherwise, if the basic elements of these grouped vibrations were as readily displaced as placed, as readily disarranged as arranged, such a thing as lasting memory would be impossible. New impressions would be continuously impairing or displacing the old, and it would be as easy to unlearn as to learn.

VITAL CORPUSCLES AND HEREDITY

But such facts as these may have another bearing or another significance, and one of great moment in biology. It is a question worthy of ponder, whether the supposed vital corpuscles themselves may not be permanently modified while occupying vital relations in connection with living things, and consequently whether or not the presence in the higher orders of life, of vestiges and rudiments of lower forms might not depend on the fact that impressions and modifications are stamped on vital corpuscles and groups, while they are passing through lower ancestral forms in a vital relation, and that these impressions fail to be effaced upon the dissolution of such forms. Such corpuscles might manifest these imposed or engrafted tendencies when later on they enter into vital relations

with higher forms of life. The subject is certainly one that presents great difficulties in the dynamics of life.

This is indeed so bold a proposition that one can here do little more than cautiously suggest it or hint at it. There is enough of probability on the face of it, however, to justify us in giving it a moment's consideration, especially as there are a number of facts in the domain of biology, as already indicated, for which it affords a plausible explanation.

It has already been suggested that unlimited division of vital energy as of all other substances, without corresponding diminution in the magnitude of the resulting parts as compared with the original whole, is unthinkable as it is impossible. In fact it violates one of the principal axioms of mathematics. It therefore follows that the vital energy of the offspring, no matter what may be the nature of such energy, cannot be derived from that of the parent form, since the parent form remains undiminished in its mental and physical integrity, after the production and separation of the offspring. Each new individual of the offspring must therefore derive its elements both physical and psychical from extraneous sources.

It is as difficult to conceive that a peculiarity of structure or power of function either mental or physical, such for instance as a mental trick, a rudiment or a reversion could be passed to a single offspring, without diminution of the like peculiarity in the parent, as it would be to conceive the unlimited division of the elements of the parent form without diminution. Therefore the tendency of energy that results in the production of an hereditary crooked finger, or a roman nose, must be attached to external corpuscles, or inhere in energy extraneous to the parent. The same would be true of the energy of such rudimentary structures as constitute reversions to, and vestiges of lower animal forms.

If it be true that the same energy that builds up higher classes of vital forms, builds up in them the vestiges of lower forms, then we are driven to the startling conclusion that vital corpuscles gathered in from the ocean of life that surrounds us, are used again and again in living forms, and that they carry with them into the new forms the impressions received by them while passing through the lower ones.

There are some facts that seem to militate against this view. Thus the fact referred to in another connection that if the horn of a deer be injured while it is tender or in the velvet as it is called, the horn subsequently growing in the same place, will during the rest of the deer's life be deformed, although the deer sheds its horns every year, and though the matrix has not at all been injured. But this deformity differs in its nature from rudiments and reversions in the feature that it is not hereditary. Here there is no reason to believe that there has been any loss or alteration in our hypothetical vital corpuscles. The change in growth seems only secondary.

The view here advanced of the origin of hereditary vestigial traits was first broached by the author in the year 1870; in a medical thesis and while he readily admits that it is too bold to be advanced otherwise than tentatively and provisionally, through forty years of thought and study, he has not been able to find a ready avenue of escape from it. However, an alternative view will be considered when we come to treat of instinct.

PARALLELS AND ANALOGIES IN VITAL AND PHYSICAL FORCES

Among the phenomena manifested in the behavior of physical forces, we may find many suggestive parallels,

and also many more or less remote analogies to the operation of vital, or at least of mental forces. And here we may enlist many helps to the imagination in pursuing our quest, however inadequate and unsatisfactory such help may be. But with this assistance, such as it is, we may endeavor to ascertain in what respects the elements of thought, feeling, and memory, bear resemblance to the common forms of force as exhibited in undulatory motion.

As already more than once pointed out, all forms of force and all expressions of energy have come to be regarded as so many different modes of motion. With a view to its application in this connection, an attempt has already been made to prove that all motion ultimately consists potentially, at least, of vibration or undulation.

In the investigation of the transmission of force by means of vibration, we also seemed to find reason to believe that such transmission involves increase in the amplitude and decrease in the intensity of the wave movement; or failing this condition, that there is at least some kind of softening effect exerted on these waves that is due to the influence of time and distance.

Assuming this contention to be proved to a reasonable certainty, let us now with this light proceed to examine the phenomena of mental activities, and ascertain whether they too, do not also depend not only upon some form of force manifested in undulations, but also in undulations that with lapse of time take on a character of increased gentleness, tenderness, and harmony; and that in this respect the force we regard as psychic or mental, presents a striking analogy to and correspondence with other forms of force found in external nature.

CONSCIOUSNESS

Before proceeding further along this line it might not be inappropriate to attempt to gain some insight into the nature of consciousness, although in its full comprehension it is entirely beyond our grasp. In its ultimate nature it must be accepted as something wholly incomprehensible and inexplicable with the light at present available, or that in any likelihood ever will be available. But there is no valid reason for believing that consciousness is an adventitious power or faculty, or that at some or any stage of evolution, it was added to the other powers of living beings. It must have existed in a latent or potential form in the very earliest and lowest forms of life. Indeed consciousness must have been present in the atoms, ions, electrons, corpuscles, or whatever they may be that constitute the habitat of what we here have called the soul, and which is most likely but an emanation from them.

It is not easy to disprove that it is a state of feeling, a rudimentary form of consciousness as well as conscience, that guides plants in many of their movements, and all classes of animals in their social behavior. We have seen that if all the energy of the life of a race were restricted to a single pair, the attenuating effect of reproduction must result in the speedy exhaustion of its vital energy, and that the perpetuation of life by the multiplication of living things presupposes everywhere about us in nature, a sea of life, a veritable ocean of the vital principle.

And while we concede the inscrutability of the intimate nature of consciousness, we may still feel encouraged to examine its contents and its workings, the repetition and perpetuation of which may be called memory, which, for want of a better term, we may extend to embrace the

entire residuum of impressions made on or through vital processes.

It is mainly through the uniformity of traces supposed to be left by such impressions that we are to be guided to their source, and out of a multitude of analogies, more or less obscure, we are to gather the light that is to illumine a most recondite, and at the same time a most interesting subject. The utmost however, that may be hoped for is to blaze a way, dimly enough marked, for whosoever will pursue the matter to a satisfactory conclusion. But to this feature of the discussion we shall need more than once to recur.

ANALOGIES OF EXPRESSION IN ANIMALS

The first if not the most striking of the analogies that serve to elucidate the laws manifested by the common force of nature, as indicating the method or character of expression among living things, is to be found in the similarity of tone and movement in which all animals are, as a rule, accustomed to give expression to similar feelings and desires. Like feelings and desires, as well as like ideas among men and nearly all animals having the power of vocal expression, call forth the same character of tone, the same character of emphasis and inflection, and are even accompanied by the same or a similar character of bodily movement. Conversely, these tones and movements, when they impress animals from without, apparently produce in them corresponding feelings and desires.

The growl of anger, the exclamation of joy, the cry of pain, the wail of grief, the chuckle of gratified desire, the pitiful notes of despair and surrender, the cooings of love,

and all other voicings of feeling and passion, we may readily recognize, even though we may never have met with an individual of the species from which they proceed.

Whatever the animal, in whatever part of the earth it may have found a home, or however high or low in the scale of being its place may be, the utterance or expression of its feelings and desires seems invariably the same in its essential character, and appropriate to the passion, desire, or feeling sought to be expressed. In those lower classes of animals in which voice is wanting, expressive movements are resorted to, that seemingly correspond with those which supplement spoken language or tone in the higher classes, and which are manifestly appropriate to and suggestive of the evident feelings and desires experienced by such animals.

These various tones and expressive movements obviously have never been learned by the different species of animals from one another; and it is quite certain that they have never been derived by tradition or inheritance from a common ancestor. Any common ancestor they could have had must have been voiceless. Long before the power of vocal expression could have been attained, animals were already scattered over the earth and widely separated. And yet no island of the sea is so remote, no forest recess so deep, no mountain gorge so secluded or inaccessible, that its inhabitants have not in some way learned the universal language of the feelings.

Beyond a reasonable doubt, then, the employment of the expressive tones and movements in question has had a common origin, and is due to a common cause. All species of animals have derived their language, employing the term in its widest sense, from some common source, have learned it from a common teacher.

What is that source? Who is that teacher? Under

what rules and guidance have the observed results been attained? For, whatever views may be held as to the origin of life on earth, we now know that these results are accomplished, not by miracle, but by natural processes in accordance with unerring changeless law; the law of the manifestation of universal energy working in and through nature.

The foregoing facts seem to point definitely to the conclusion that all mental impressions and activities whatever, are due to the behavior of the vibrations or undulations that are the mode of expression of the forces operative in that part of the brain which constitutes the arena of such activities. These vibrations which are persistent and only less than infinite in number and variety of combinations, ordinarily play upon the neurons unapprehended by consciousness, and thus perform the myriad tasks of bodily growth and change and of subconscious mental work, while from time to time, they prove strong enough to claim recognition on the part of consciousness.

NATURE OF MEMORY

It is the various groupings of the vibrations of the nerve energy in the brain that constitute all forms of the manifestation of mental activity, whether of sensation, idea, emotion, judgment or any other character. And it is the persistence of these groups in the neurons, together with the various modifications they receive from successive sense impressions, that constitutes what might rightly be denominated memory. These impressions it must be noted, however, refuse to be merely preserved. For, caged in the neurons they must be allowed all manner of intricate free excursions giving new positions and arrangements; each promenade calling for new partners in the never ending dance.

In order to utilize the aid offered by the various characteristics of the common force in interpreting mental manifestations, we may now particularize, and trace out some of the many resemblances between the different forms and aspects it presents in such manifestations, and the affections exhibited by the mind in receiving, retaining, and reproducing impressions.

Mental and physical force or energy as was long ago pointed out by Sir William Carpenter, are correlated and mutually exhaustive. Almost the entire strength of either body or mind can be exhausted in work done by the other. Ages ago, the author of Ecclesiastes declared that much study is a weariness to the flesh. To claim then that mental energy is distinct from all other and peculiar, is to claim that the energy of muscle is also distinct and peculiar, and in that case it would be consistent to claim for muscle a separate spirit, as likewise for the plasma of the various tissues.

If this contention were true, it would result in removing the energies of both the mind and the body from the category of the common force; and this in the face of the fact that we can definitely calculate the quantity of energy communicated to the body by the oxidation of a given quantity of food. At the risk of further repetition, it may be said that all these facts point to a peculiar atom or corpuscle rather than to a peculiar force as the basis of life.

We have already seen that waves of water, the vibrations or tremors resulting from the shock of earthquakes, as well as many other kinds of wave movement, grow progressively slower, gentler and more harmonious as they advance through space, and that if the same has not been proven true of the waves of light and sound, yet that these too carry in their gait some of the marks of travel.

It is obvious that a mere transformation can add nothing. That is to say that nothing can be absolutely gained by a mere transformation of parts. Therefore, whatever appears in the thing transformed or translated, has existed in the original. The coarser waves have in them only what they derive from the finer vibrations that constitute them.

Returning then to the contemplation of memory in the wide sense in which we have felt constrained to regard it, and with special reference to the laws bearing on the relation of the intensity of wave movement to distance of travel in time or space, it may be said to be a matter of common observation that ideas of things or events far removed from the present in time or space, are called up in the mind by suggestive impressions that reach us through the medium of slow and gentle vibrations. On the other hand, suggestions presented to us in terms of short, violent or abrupt and inharmonious vibrations, call up ideas of things less distant, and also ideas more recently formed, or feelings more recently experienced.

Thus the view of lofty mountains dim and azure-hued with distance, vistas opening out into the boundless ocean, the moaning of the winds through the pines and leafless forests, and above all the strains of low pitched, soft and plaintive music, fill the mind with reminiscences of things that are far away, and events of the long and almost forgotten past. And so it comes that for that simple instrument of music which gives the softest and most melting of tones, "far windharp" carries everywhere the impress of a self-suggested name.

On the other hand, quick and lively tunes, spirited breezy music, necessarily made up of short vibrations, reenforce the vibratory currents in the neurons that have to do with quick movements, and thus the inclination or

tendency to quick movements is impressed in consciousness or even unconsciously awakened. Indeed such movements are most often called forth or come forth involuntarily, before they are suggested to consciousness. In either event, the reason or cause of such quick movement is, that the incoming vibrations correspond in character with the memory vibrations that constitute the record of their respective impressions in the brain and give them added strength.

The memory record of recent events and things nearby is preserved in the neurons, by means of, as well as in terms of, short vibrations, so that when these are aroused and strengthened by other incoming short and sharp vibrations the mind intuitively feels and realizes that they come from some object in reach; and it is for this reason that we instinctively and involuntarily move under such circumstances as if to seize such object or to avoid it. The snap of a finger nearby will startle us, while the roar of cannon in the distance merely quiets us into listening.

No one dances to "Old Hundred," and no one worships or laments in ragtime. So, upon the other hand, whatever is revealed or made palpable to consciousness in terms of softened, slow or gentle vibrations, reenforces such vibrations in the neurons as have become the memory of, or that perpetuate in memory, impressions of events and objects that are long past or seemingly far away.

Under such circumstances and conditions, the body is impressed through the mind to stillness, to quiet and silence, because the source and cause of these vibrations is instinctively recognized as being far away and beyond its reach. "Be still and know that I am God," is an injunction aptly suggestive of an all pervading truth. For only in stillness and silence can the mind even attempt to grasp or contemplate the infinite.

This relation of fitness, as between the mode of suggestion and the thing suggested, between the language employed and the thought it conveys or the thing it describes, has found universal expression in the choice of tones in music and speech, and of measure, rythm and cadence in poetry as well as in all expressive bodily movements; in short, in all the schemes and delineations by which art has sought to impress the mind through the portrayal of the abiding truths of nature. It is the key to all harmony, the spirit of every symphony. It is the inspiration of genius. It is "the law even the holy law that imposes beauty on the artist."

In every clime and in every age, men seek to conduct the exercises imposed by their religious beliefs, with a solemnity distinctly related to and suggestive of the estimation in which are held the objects of their worship. If the deity selected for their adoration be regarded as limited in power and incomplete in divine attributes, then the speech, the attitude, and the character of movement and other accessories of worship, are not greatly different from those employed by men in their familiar intercourse with one another.

Thus to the Greeks, Jupiter, whose throne was no higher than the crest of Olympus, where they themselves could chase the panting hart, was little more than a superior Greek. Besides, the Greeks themselves were too exalted in intellectual acumen, too clear cut in their mental vision, to regard with extreme awe the claims of any supposed superior being, either presented or represented to them for adoration. But as more than once has been suggested, nations and peoples, dwelling among cloud-compelling mountains or in the midst of frequent astounding outbreaks of storm and earthquake, and often terrified by famine and pestilence, came to regard their deities with an awe correspondingly greater.

It must have been in the tame expanse of the delta of the Nile that the idea was suggested of a God who talked with men face to face as a man speaks to his neighbor, or who came down in the cool of the day to walk in a garden.

But the deity who sat enthroned above the sky-piercing Himalayas, or rumbled his thunders from lofty Sinai, aroused emotions in the bosoms of his worshippers that called for soft, deep monotonous, slow and submissive, as the language of devotion, and for whatever grave and solemn accessories might be devised to manifest the awe with which their minds were impressed. What else can mean the peculiar "far away" feature of the "holy tone" possessed or affected by the leading votaries of nearly all religions, or what the full-volumed resounding echoes provided for in the structure of religious temples.

This language of worship, varying with the conception each worshipper forms of the character of his chosen deity, has not in any likelihood been passed from any one people to others, or handed down from any common ancestor as a tradition. There must then be a cause for it in the nature of things, and that cause must be in the constitution of the human mind and the nature of energy; a cause that operates everywhere and continuously. The universal aim in religious services devoted to beings conceived of as possessing unlimited might and power, and seemingly far removed is to give expression to feelings, ideas, and emotions naturally awakened by the contemplation of a being vaguely conceived, vast, gentle, kindly, and far away.

Therefore such music and tones of speech and other accessories are habitually chosen for the act of worship as may arouse such memory waves in the organ of mind as are most nearly related to those by which impressions of an object conceived to be vague, vast, gentle, kindly, and far away would be communicated to it; for, undulations

of this ample nature are the primal elements out of which our ideas of such objects are formed, and by means of which they are preserved and perpetuated in memory.

Religious or sacred paintings and sculpture partake of a like character, and this character serves aptly to express and convey an important truth, all-pervading and eternal; namely: the truth that religion is born of the gentlest vibrations that the trembling ether can convey to the human mind. Notable especially is the expression of far away, restful communion portrayed in the features of portraits of the Madonna and other sacred paintings, masterpieces of genius, created and struck off by it in moments of its most complete abandonment to the spirit of inspiration.

And not only is it true that men incline to transform these gentle influences of the manifestations of energy in their own minds and hearts and ascribe their origin to their deities, but they also personify them and out of them create their gods. While the race was yet young, when the sound of men's voices, in answer to their calls came back to them from cliff and crag and cave, they conceived that a hidden spirit was answering back their words, and they deified the fancied spirit and named it "Echo."

And so when men came to feel their bosoms surging with emotions of love and awe and mystic veneration, creatures of the gentlest undulations the universal energy can evoke, they conceived that these feelings, though really born of their own hearts and minds, were the voice of an unseen spirit; and this spirit they personified, gave it a local habitation and called it "God." And the gods are mostly good, for men have made them of their best.

The proneness and power to adapt tones and movements to the nature of the ideas to be expressed, is strikingly shown in the language of children and savages, who ever seem to be closer to nature than her maturer offspring.

Thus the child will speak of an object, but a short distance away, it may be, but which in the untraveled pathways of its brain may have impressed its consciousness as being far distant, as "away off yonder" in slow, deliberate and measured tones that plainly correspond to an unconscious realization of the manner in which impressions made under such circumstances reach, and are recorded in the sensorium.

It is said that there are certain savages, who, having no modification of terms in their particular dialects to express comparison and being greatly deficient in words, are accustomed to express various degrees of property or quality by varying tones of voice and appropriate, expressive gestures. Thus the same word in such dialects may be made to designate a rill, a rivulet, a brook, or a river, according to the tone and gestures with which it is enunciated.

The tendency of the thoughts and feelings toward a gentle pervasive melancholy, when dwelling upon one's experiences of the remote in time and space, or upon fading reminiscences of the long past, is strikingly exemplified in the music of savages and other primitive peoples; the music of such peoples being almost invariably pitched in the minor key.

Under similar promptings, civilized peoples likewise associate sadness and melancholy with the minor key, which for that reason is commonly called the pathetic key. All of this seems to indicate that this character of music and this class of feelings rest in some way on a common foundation, or touch in some way upon a common chord.

It is known that the minor key is produced by reducing the number of vibrations in the second from 300 which constitute the major key, to 280 for the minor key. But why should the dropping of 20 waves to the second be

conducive to feelings of sadness or melancholy? We have reason to suppose, as later on will be more fully explained, that the elements which in the neurons constitute the record of gentle melancholy, are vibrations that along with other and unknown changes have become slow and obscure, and which when reenforced by kindred lagging waves, and aroused so as to affect consciousness, suggest the far away and the long past with a dim recall of broken ties.

That which appears far away to the savage or the child may not appear so to the scientific or the cultivated mind; and therefore with the passing away of the childhood of the race or the individual, in a manner passes away also the significance of the employment of the minor key in music. The saddening influence of the tremolo is susceptible of a like explanation.

The simple dropping off of 20 vibrations to the second in the change to the minor key may not seem adequate to the effect produced, but it may also be that the loss can operate by way of suggestion; that is, by arousing in consciousness, dormant feelings of sadness that have been derived from various other sources and stored in memory on various other occasions. The literature of poetry is rich in this class of suggestive features; and the chief merit of many a masterpiece consists largely in the fact that it affords apt and appropriate employment for tones and movements expressive of the various feelings and emotions. It is this correspondence with an internal order, this far-reaching suggestiveness that constitutes the basic truth, and the real value of the most esteemed productions in literature.

THE THEORY FORMULATED

Having proceeded thus far with this preliminary investigation we may now appropriately enter upon a definite

and systematic statement of the theory to which the foregoing facts lead, and which they tend to elucidate. The theory assumes:—

First: That the basis of life is constituted of certain infinitely minute and vastly abundant refined material corpuscles, endowed with a form of energy which may be denominated the vital energy, and that these corpuscles with their forces have a tendency to enter into groups and forms that correspond to every possible manifestation of life, and that they direct and primarily determine all natural physical features, and the nature and quality of the mental constitution, that is to say, they control and determine the inauguration, the development, the building up and maintaining alike of mind and body.

Second: That all bodily growth and movement and all mental activity as well, are the result of vibrations ultimately directed and controlled by the fine movements of the vital corpuscles in accordance with the natural laws governing vibration.

Third: That a constant current of nerve force, or a force that is susceptible of being transformed into nerve force, derived from nutrition supplied the body, is continuously traversing the nerve circuits of the system; and that this force consists in large part if not wholly of vibrations similar to those found in external nature, and translatable into them.

Fourth: That in the cells of the nerve system and in various combinations of such cells, orderly groupings are effected among their constituent atoms, molecules or corpuscles, by waves of light or whatever else may affect any of the senses, or enter in any way into a modification of the nerve elements.

Fifth: That such of these vibrations as are realized as sensations, together with such as affect the sensorium with-

out exciting consciousness, combine by certain rules of unconscious or automatic logic, or quasi design or intelligence, in such way as to form perceptions, ideas, emotions, judgments, and all other like outcome of mentation.

Sixth: That these groups of vibrations passing from molecule to molecule within the neurons, or from neuron to neuron by way of the connecting white tubules, or even by direct diffuse emanation, may rise successively into the scope of consciousness; and that they occupy the attention of consciousness in the order of the number and intensity of the waves of which they are composed.

Seventh: That the tendency of all these vibrations and vibration groups is to grow gradually slower, gentler, and weaker; that normally there circulate continuously, both within and among the neurons, innumerable trains of vibrations, the residue of former sense impressions that have become too weak, and others arriving or springing up as emanations that have never been sufficiently vigorous to force themselves unassisted into recognition by consciousness; and that these gentle or subsiding vibrations, from time to time, excite the attention of consciousness and gain recognition from it, either by taking to themselves other waves of a nature and character akin to their own, gathered from those already in the neurons, or else by gathering and assimilating softened and gentle undulations directly from without.

Eighth: That all sensations, perceptions, ideas, emotions desires, judgments, and other similar outcome of mental activity, whatever, are essentially one, and have as their basis the same ultimate elements, namely: sense-impressing vibrations coming from without, chiefly from luminous bodies, variously combined with or grafted upon the normal force movement which is constant in the nerve system.

Memory in its fullest extent, as already observed, is supposed to be nothing else than the persistence of these undulations in the nerve centers, either with or without their distinct reappearance in consciousness. Nor is it to be lost sight of that the development of physical form and structure, as relates to living bodies and physiological activities as well, are likewise based upon the same fundamental elements as the mental; all of them are the outcome of vibratory expression of some form or aspect of energy.

LIMITATION OF SENSATION

The restrictions to which the range of sensation and perception, and consequently memory is subjected, must be determined by the range of vibrations that affect the sensorium. And since only a small proportion of the vibrations that occur in nature may produce conscious impressions on the human mind, it is a just inference that among the vibrations that make up the constant and permanent nerve current, and which are the immediate result of tissue metamorphosis, are not found any to correspond in character to such as coming from without do not meet with a response. That is to say that while the variety of vibrations in nature is practically infinite, the number of the kinds capable of affecting consciousness is limited to the number native to the brain.

Some nerves can carry only messages of pain, and are unaffected by such vibrations as affect sight or hearing. Indeed the general rule with sensory nerves is that each class is unresponsive to the impressions that affect the others, and the neurons are probably restricted in receiving impressions in the same way that the axons are in conveying them.

The proportion of vibrations out of all that may at any

time be in existence, that can affect the senses, must be very small indeed. Aside from the infra-sensible and the ultra-sensible vibrations, there must be, it would seem, vast numbers that go to fill up the gaps or hiatuses, which are not covered by any sensing power in the mind, such for example as those that exist between the different colors, or between the point where sound leaves off and sight begins. Thus vibrations of the order of sound below sixteen to the second or above ~~42,000~~ to the second are not recognized by the sense of hearing. The kindred senses of touch and pain fail when the vibrations are above a few thousand, and this so completely that a member or an organ may be severed from the body of an animal by a rapidly revolving knife without the animal feeling it.

Smell and taste may and probably do depend upon some kind of chemical effect produced upon the extremities of the appropriate special nerves, but this effect must be accomplished in terms of vibration; and especially must the impressions made upon the end organs at the extremities of the nerves in these cases, be carried to the nerve centers or sensorium by nerve currents that are incontestably vibratory. As the existence of these vibrations has not yet been demonstrated, the exact range of their rapidity is of course not known, but judging from the low speed of the nerve current, it is probably not great.

Sight begins with 395 million million vibrations per second and ends with 760 million millions, but between the different colors there are gaps in sensation that in nature must be filled with a vast range of vibrations imperceptible to the senses. The gaps that exist between the different kinds of light, and among other sense-impressing forces, are far more likely to be due to deficiencies in the equipment of the sensorium than to the processes by which the vibrations are emitted. Vibrations, it would seem

must be sorted out by the organs of sense in distinct groups or stages for the different kinds of light, otherwise their impressions would so gradually blend one with another that there could be no distinction of colors. And yet, since in very sensitive states of the nerve centers, vibrations may be perceived or revealed that under ordinary conditions are not manifest; and since many of the lower animals are sensible to impressions that are wholly imperceptible to our minds, it would appear that the margins of these gaps are not abrupt, but that the power of perception shades off gradually. Thus, while color and other sensations are in a great measure rendered distinct by the arrangement of the apparatus of mind, they shade off one into another as is required by the laws or conditions of association. This is the only way apparent by which memories or impressions made in one form of vibration could be aroused by those constructed of another form. With complete distinctness there could be no helpful association of ideas; there must to some extent be an overlapping.

MECHANISM OF IMPRESSIONS

We may regard as the first step in the mechanism of impressions, the development of the current of nerve force that probably throughout life is continuously making the circuits formed by the outgoing and incoming axons, the neurons and other intervening tissues. This current of itself doubtless arouses a vague, indefinite consciousness, or causes consciousness to be more alert during waking hours, so as to produce a vague form of mental activity that probably would be perceived and in a sense realized by us, even though we may never have experienced a sensation. Next there may be supposed to follow, a

character of change producing what might be called articulate modifications, and due to the circuit currents becoming freighted with sensations and various combinations of sensations.

These modifications must depend upon the presence of some kind of material element in which they take place, as already more than once indicated, whether this element consists of molecule, atom, ion, or electron; for it is not conceivable that permanent or stable forms or groupings can be perpetuated in a field of pure force, that is, a field of force that is isolated and localized in otherwise empty space. Vibrations originate with ponderable matter, and manifest themselves as energy when they impinge upon ponderable matter or are resisted by it, but they do not tarry in the imponderable ether.

When we gaze upon a cloud that is clinging to a mountain peak, while the wind about it moves constantly on, we may feel sure that the cloud is not persistently constituted of the same identical elements, but that it is all the time reforming out of the mist or watery vapor that has been borne up over the mountain crest till it has reached the point of condensation. So also when we find an eddy in a stream of water, ever drifting away and ever reforming, we will seek not mistakenly for some fixed and firm mass stationary in the stream as the cause of the eddy.

So thought is not a thing stationary, but the continuous product of a movement of nerve force passing from and over ponderable particles, infinitely small it may be, but still particles that we recognize as solid or ponderable.

Thought being therefore such an emanation and not a fixed thing, the thought of this moment is never the thought of the moment before, any more than the cloud clinging to the mountain peak this instant, is composed of the same watery vapor that constituted the one of the instant gone

by; or any more than the eddy that flows away from the sunken snag at noon to-day consists of the same water that constituted the eddy of yesternoon. Thought, then, is such a cloud stream, or such a chain of eddies, that is constantly being renewed and constantly flowing away, and that continues until the molecular mechanism on which it depends is radically changed or obliterated.

CHANGES IN THOUGHT FORMS

Thought seems to find its source of modification of form in modifications of its material mould or guide. We might alter the cloud effect in our example by changing the form of the peak to which it clings, as we might alter the form of our eddy by changing the obstruction that determines it.

In forms of growth that in their appearance and nature are closer to mind than are the examples given in illustration, we may find examples of a permanent change of product arising from subtle modifications of the matrix out of which they grow. Thus, as already mentioned, if a deer's horn be broken off while yet in the velvet, in all the subsequent years of the deer's life, only a deformed horn will grow in the place of the one broken, and this notwithstanding the horn is only the outgrowth of the external layer of the skin, and destined to be shed every year. Likewise if the matrix of the finger nail is injured, a deformed nail grows from it ever afterwards.

As a supposed illustration of the method of the revival and reinvigoration of vibrations which have constituted the elements of past thought or other outcome of mental activity, let us conceive that a stream of sense-waves derived from any of the organs of sense, reaches the sensorium and there falls in with a group of homogeneous waves

that have been for some time present, but have become too feeble or too monotonous in their movements to arouse consciousness; or that having been transformed into the common material of thought in separate neurons, these newly arrived waves find and fall in with such kindred. The result will be that the idea or other thought product that these weakened waves once constituted will again be revived in consciousness and brought into the sphere of its recognition.

When the vibrations that occasion such revival come fresh from without, the predominance in potency may be either with the sets of vibrations already in the neurons, or with the newly arriving ones. And just in proportion as such predominance may be greater with the one set than the other, that set will be recognized by consciousness as constituting or most largely constituting the new idea or other outcome of mentation.

Thus if the sets or groups of undulations already present in the neurons predominate to a controlling degree, the newly arrived waves may in that case fail to be distinguished or separately recognized by consciousness, and as a consequence the product of the combination will appear as a reminiscence or recollection, which will be modified either sensibly or insensibly by the recently arrived vibrations; but if, on the other hand, the newly arrived vibrations distinctly predominate, a seemingly new idea or other mental product will be formed which will, however, be more or less dimly colored or tinted by the fading undulations of the old idea already become quiescent in the circuit of the neurons.

Under such conditions the vanishing undulations, so-called, may reach and impress consciousness as half recognized old acquaintances, arousing a flood of vague feelings or impressions, and suggesting associations in places far

away, or incidents of the long forgotten past, and these will be incorporated with the new idea. As expressed by Darwin when ascribing this feeling to inheritance from remote ancestral forms, "Through the dim shadows of the mental images thus formed, there will often flicker glimpses as of life and scenes in another world or another state of existence." Or, as Richter says of music, they lead us into communion with things we have not seen and yet shall not see. Or yet again, they point to the "light that never was on land or sea."

ANALOGIES OF THOUGHT

More than upon aught else, we are compelled to depend upon analogies between the operation of mental and physical forces for the elucidation of mental activities. Such an analogy, drawn from a practical illustration of the laws of sound, may serve in some measure to throw light upon the manner in which vibrations from without, of the same nature as those supposed to exist within the brain as the residue of former vibrations, can enable such vibrations to arouse consciousness, and manifest themselves as modified memories.

It is a recognized law of acoustics that the multiplication of a sound of a given intensity does not affect its loudness. That is to say, that a sound produced by many voices will carry no farther than when produced by one. Yet the sound of many voices combined can be heard farther than one though that one be as loud as the loudest of those combined. A single bee may be buzzing near us and not be heard, but if another or others join it in the same situation, together they may produce a distinctly audible noise. Likewise, raindrops that singly could be heard at a distance of but a few feet, may be multiplied until they

can be heard falling on the leaves of a forest many hundreds of yards away.

So it may be with the undulations that at the seat of consciousness have become the record of events, the memory of things. With the lapse of time they have been steadily subsiding, steadily becoming less and less vivid, less and less distinct, until they have settled down into that quiet where they bid fair to remain forever, beyond the utmost grasp or reach of consciousness.

But sight or hearing or taste or some less specialized sense, brings in from without a group of kindred waves, or within the halls of the neurons new couples are formed among the participants in the intricate mazes of the never-ending dance, or many pairs or groups may join in noisy promenade. So strengthened they force the ears of consciousness to listen to their message; and thus ideas and emotions with other furniture of memory, till then in abeyance and drowsy almost to final sleep, are made to reappear on the open arena of mental activities.

These welcome intruders, these re-enforcing vibrations, do not need to be absolutely identical in nature and character with the elements of the thoughts they arouse, though as already shown, they must be closely related.

If it happen that memory waves in the neurons are fading and must depend on sense waves from without to revive them, it would seem that they need to accept the aid of vibrations slightly different from themselves, otherwise re-enforcement or assistance would be scant, and comparatively few of the fading ideas would receive it. If the memory waves in the brain, in cases of spontaneous association, could be reenforced only by other waves of exactly and identically the same character, the arousing of memories that depend upon associations of this nature and upon this class of excitations, would well-nigh cease; for

since impressions are for the most part made successively, nearly all memory vibrations must differ in the time element at least; that is they must be made one after the other.

But whether the renewed thought or revived idea comes again into consciousness by aid from without or within, it may again be said, it never remains the same. It is no more possible to think the same thought twice, or feel the same emotion twice than to see the same cloud twice journeying across the sky, or the same smoke-curl twice floating through the air in identical substance and form.

GROWTH OF IDEAS

A thread, a needle and a woman's deft fingers, and then the filmy lace whose beauty is a marvel and whose complexity and intricacy suggest a mystery. A simple stitch begins it, by a simple stitch it progresses, and by a simple stitch the finishing touch is given. So with the idea, the concept, the emotion, or other thought-structure, however complex it may be. A simple vibration begins it, by simple vibrations it progresses, and by simple vibrations the final touch is given that brings it to completion. The progress of its development when once well understood, must prove to be simple. Its construction must be achieved by simple steps and with simple elements.

UNIFORMITY OF THOUGHT PRODUCTS

It is hardly to be questioned that if the sense organs of all individuals are of one nature, sense vibrations must perpetuate the record in all minds in a practically identical manner and form. Therefore, all obvious attributes of an object must produce a similar impression on every mind

insofar as such attributes are concerned or involved in the impression, other things being equal; for we have proceeded on the assumption that forces of the same nature have everywhere built up both mind and body.

It follows also that if all impression is made upon the mind ultimately by the same elements, then expression ought to be the same with all living things, and especially ought language to be everywhere the same; and more particularly should this be the case with speech among human beings. In that case also what is known as onomatopoeia, in which the sound of the word should to all minds alike suggest its meaning, ought to be the rule and not the exception. And it is possibly true that in its deeper significance, onomatopoeia or word-picturing will be found to be universal.

Can we not by a careful search and analysis find a common basis for the interpretation of all languages, and a key, as well, for the translation of words into ideas; and likewise the converse of this process? If the vibration theory holds, this is to be accomplished by conceiving words and ideas to be resolved into the vibrations that constitute their primary elements.

Just as we found that the short, light steps of soldiers marching to music over a bridge are eventually combined into the ample, possibly destructive vibrations, involving the entire bridge, just as the ripples on a sheet of water, due to the soft fanning of a breeze may eventually become the wild wave still combining, still infolding, hidden but not lost or destroyed, all the tiny ripples that at the first only dimpled the water with their gentle smiling, so also may all language and all expressive movement, both mental and physical, be but an aggregate of the still implicate vibrations that produced them, and which in the neurons constitute the record of experiences. These primary

vibrations are the elements into which all impressions may be translated in the mind, and out of which all expression is wrought, whether that expression be by movement, look or word.

It is in this way that direct designations, such as the names of objects, although ever so multifarious and possessing apparently no suggestive character or no associating link between name and property or quality, will yet call up the same mental image in different minds.

We may select for illustration the name of any widely familiar object, such for example as the word, "horse." The uttering of the word, "horse," in any language or dialect spoken among men will at once suggest an individual image of a horse to those who speak that language or dialect, though it may be that not one of all the names is a thought-word, or a peculiarly self-explaining word, in the right sense of the term.

This rule applies also to all words that are not obviously descriptive or inherently suggestive, but which may yet call up in memory definite ideas. Can it be that here is to be found the one language into which all others may be translated?

Or can it be maintained that there is in the nature of things one fundamental language, perfectly true and expressive in which thought and thing, sense reports and spoken or acted word are not only related but mutually interpretive? Is there in nature around us or anywhere one simple, expressive tongue into which all others are translated in the clearing-house of the mind, the "*una lingua celestibus*?"

But how can this unification be attained? Where and in what way can all languages be interpreted into one? The nearest and the only common meeting-place to which ideas, words, and expressive movements can be traced is

in the vibrations of the nerve energy in the neurons, and from that simple element they all primarily spring.

It is most likely that the undulations which in the mind form the sense-derived image of an object, enter there into groupings or combinations with the undulations that constitute every other attribute or name that such object is conceived to have acquired; and that the mental concept or idea of the object grows with the addition of every new name or attribute.

Thus, though as said before, we may designate an object such as a horse, by a hundred different names, each of such names, whether read or heard or made out by the touch as is the case with the blind, will to one who knows its meaning, form a part of the complex idea or notion of a horse, just as will the neighing or hoof or mane, or any other part or attribute. And sensed undulations produced by any one of these objects or proceeding from any one of them, will call up in consciousness the idea of a horse.

And furthermore, any attribute pertaining to the idea or any element of it as it exists in the mind is calculated, when drawn into the sphere of consciousness, to summon the whole complex idea with it. Every attribute then becomes a handle by means of which the idea in all its fullness and complexity may be summoned into consciousness.

GENERAL AND ABSTRACT IDEAS

It is doubtful if there is any other general and abstract idea or notion of an object than such as is formed by, or is due to, those vibrations which are from time to time marshalled before consciousness in the order of their number and force. The vibrations of any given kind, if numerous and long continued, become firmly rooted in

and thoroughly impressed upon consciousness. On the contrary sparse and weak ones are merged and practically lost sight of. If we were accustomed to seeing horses invariably white, and had never heard of one of another color, whiteness would attach itself to every idea of a horse. The same would be the case with the idea of the saddle or bridle, if we had never seen a horse or met a description of one without such trappings.

Likewise the general idea of a tree is constituted of the persisting vibrations with which consciousness or the sensorium has been most often and most forcibly, or at all events most effectually impressed as having proceeded from a tree. The general or abstract notion of a tree is that of a composite tree. Nor does there probably exist an absolutely or strictly abstract idea of a color or quality, any more than of an object.

We may, for instance, have seen so many thousand different objects in nature, which are green during the season of growth, that the vibrations they have implanted in the brain practically neutralize all other impressions; or the latter are so diffused or so dim in comparison with the vastly more frequently recurring vibrations of green, that ordinarily the idea of greenness seems to be made up of elements apart from any object of which the color is a quality. But pursuing and pressing the thought, we soon find that the idea of greenness is based on the appearance of an object or objects that are green. The notion of a green sun or a green sky never occurs to us spontaneously.

THE ORIGIN OF LANGUAGE

There is every reason to believe that language or speech using these terms in their widest sense are instinctive, and are the product of orderly vibration groupings. It is

furthermore most probable that children have been the inventors of the great majority of words found in human speech.

It is matter of common observation that children freely invent words and often ascribe to them meanings. Later in life the brain becomes less prolific, and is also channelized or beaten into paths by the habitual use of a ready-made stock of words, and then if new words are formed, it must be mostly by putting together words already in stock.

In the beginning, children, no doubt, often reveled in the manufacture of words, even as they now do. The vast majority of these words had no meaning. But now and then a word would be constructed, or used coincidentally with an act, and this act would qualify the word; would give it a meaning. When the person who had used the word came to convey the meaning to another, he would interpret it into the act. Thus, if when he was digging roots, he happened to use or hear an expressive word, and then attempted to convey to some one an idea of what the word meant, he would repeat the act of digging, and thus convey the idea. If, however, the idea was not concrete, but such an abstraction as envy, for example. he might have a word that to him was used coincidentally with the act of envying, and to him might have meant envying. But he would be unable to explain that word to another by any intelligible act, and the chances would be almost infinity to one, against another person using the same word to him to express the same idea. Hence nearly all words except demonstrational predicatives, perished and only demonstrational predicatives were left to form the basis of all languages.

But these words were formed instinctively. They were the products of vibrations given off among the neurons. and which primarily might have been traced to the direct-

ing vibration of vital corpuscles employed in building up the organism. And thus it would follow that language, or speech is in its production like the outcome of all other vital activities and ultimately instinctive, or automatic.

FICTITIOUS ENLARGEMENT OF THE IDEA

In the light of the foregoing considerations, it is easy to discover the motive that actuates men in the utilization of fictitious elements of greatness, or of what are usually regarded as the outward accompaniments of greatness.

The constant aim of those who crave adventitious grandeur is to enlarge the idea of themselves in the minds of others, and by reflection, in their own. "Fine feathers make fine birds," is a very old and a very true proverb, insofar as it relates to the popular estimate of greatness.

Accordingly, men who occupy positions which they are persuaded ought to be regarded as ennobling or exalted are wont to affect such bearing, attitudes, voice, dress and general deportment as men are apt to associate with their notions of greatness. These borrowed elements enlarge the idea of the rank of people so situated, in the minds of others, and usually in their own minds. This class often incline to rumbling, orotund monotonies, such as one naturally inclines to employ when looking down on an audience from above while making an address.

Indeed the relaxation of the vocal cords, voluntarily effected by the most part of the clergy and their imitators, in the effort to produce the so-called "holy tone," often gives rise to a special diseased condition of the vocal organs known as, "preachers' sorethroat."

Wherever it happens that the multitude is especially backward in intelligence, open-mouthed with blank credulity and dominated with eager expectation, displays

of gaudy and glittering trappings supply an accessory in the way of conferring fictitious greatness by no means to be despised. Tinsel, cochineal and aniline prove to be wonderfully efficient contributors to the estimate of grandeur as it exists in the popular appreciation.

In the eyes of the unreasoning multitude, it often happens that glittering tinsel, bejeweled and bespangled headgear together with pompous, imposing stride, exact a higher appreciation and a humbler homage than all the exalted qualities of the head and heart man ever yet has been known to possess. If to these acquirements can be added gorgeous trailing robes, handed down as a legacy from the ages when our savage ancestors hung from their shoulders their only garment made perhaps from the undressed skins of beasts, the one so favored is well on his way to the making of a demigod.

The ecclesiastical or civil dignitary, with trailing gown bedecked with gaudy, brilliant colors, with glittering crown and movements of pompous stride, is traveling exactly the same path as the strutting savage adorned with strips of gaudily colored cloth and fantastic headgear. All alike are seeking to enlarge the idea of their personality in the minds of beholders, by means of vibrations borrowed from extraneous objects striking and imposing in effect.

TIME ELEMENTS IN IMPRESSIONS

In harmony with the undulatory theory of mind and form, is also the fact that the tenacity with which the mind holds impressions made upon it bears a direct relation, other things being equal, to the length of time the vibrations from a given source may have continued to play upon the seat of consciousness.

Thus after having suffered from certain forms of fever,

such for instance as rheumatism, men have been known to have let slip from memory all knowledge or remembrance of the impressions of occurrences experienced during the period just previous to the attack of illness. Similarly those who have suffered from concussion of the brain, or a stroke of apoplexy will often be found to have forgotten impressions made upon the mind at a date just anterior to the occurrence, though such will be less the case in proportion as such impressions may have been made in a vigorous manner.

The undulations in these cases moving in and among the neurons, not having had time to form a sufficient number of acquaintances, so to say, found no friendly companions to wake them after the shock and aid them in regaining the recognition of consciousness.

APPARENT SHORTNESS OF TIME

In a similar way, by a converse process, we may be able to account for the seeming shortness of the periods of time embraced in our remembered experience. All the long years of life that is past, however slowly they may have seemed to drag in the passing, appear in memory but as yesterday. "Time flies" is an adage universally current; but it is impressed far more in the retrospect than in the actual experience. In truth, time itself, like space, gives off no vibrations. No force is exerted by it. No energy proceeds from it. Purely as time and space, considered absolutely, these terms constitute no idea; the mind takes no cognizance of them.

The only way in which they can enter into the formation or production of ideas is by constituting intervals in consciousness among occurrences or acts, or among substantive objects as related to each other. They are there-

fore merely the relations of such things as can be the subject of thought.

These intervals that serve to show the relations of events, are overshadowed and lost sight of in the crowding of experiences in memory. The reason or the cause of the apparent shortness of past time, seems to be, that the undulations which in the brain constitute the record, the memory of each hour, are entwined with and kept alive by those of the hours that follow; the more so as passing experience may be monotonous, and the undulations that constitute their record are more nearly alike in character.

It is thus that closely united or blended together in memory, years are made to become as days, and weeks as moments. We call time short, in part at least, because it is made to seem so by the mechanism of memory. It is in this way that those who have been associated with us from childhood seem never to grow old. The brother or the sister though silver-crowned and bowed with age, is the brother or the sister of the play place still; and venerable companions of wedded life, even though trembling on the borders of the undiscovered land, or tottering down the hill of life together are still the one to the other, the manly groom and the radiant bride bedecked but not adorned, with orange blossoms at the altar.

THE LAGGING OF MEMORY IN DREAMS

A further argument favoring the view of the progressive slowing and final obliteration of the vibrations that constitute memory, may be drawn from the tendency of seemingly forgotten events to recur in dreams; though this may be susceptible of a different interpretation.

It is a peculiar feature of dreams that altered circumstances and conditions are seldom realized in them until

after a considerable time has elapsed subsequent to the change. The scenes that appear in our dreams when we have made a change of residence for instance, are, as a rule, for a considerable period of time after the change, almost invariably laid at the place of our former residence, and crowded with misty but familiar incidents and features.

It not rarely happens that on returning to visit former haunts, and especially those of childhood days, after a long absence, we are surprised to find scenes that we recognize as having oftentimes, more or less dimly obtruded themselves into our dreams, or as having given these dreams their settings; scenes which yet in our waking hours seemed to have wholly disappeared from conscious memory. An interesting example of the principle is to be found in Milton's description of the visits of his dead wife to his bedside in his dreams.

This character of experience may be accounted for in part at least upon the assumption that nearly all motion and movement both about and within us while we sleep, are, as a rule, slower than those of the waking hours and the day. The breathing is slower, the heart beat is slower; and beside the general stillness that surrounds us, the senses are closed to excitations from without, so that the memory waves of the past, undisturbed by fresh undulations, have freer play upon the half awakened consciousness.

Night even without sleep brings far away memories; and few indeed are they who may not repeat with the poet:

"Oft in the stilly night,
Ere slumber's chains have bound me,
Fond memory brings the light
Of other days around me."

We seldom realize in dreams, till after the lapse of considerable time, the fact of a great calamity that may

have occurred in our personal experience. Bitterly as the waking hours may be haunted by the memory of a desolating loss, a stinging sin or a crushing sorrow whose only mercy is that experience teaches that it must pass away or be softened by time, we may still lie down to pleasant dreams; may still in drowsy respite borrow glad moments from the happy past; and then on waking to a troubled realization of the painful truth, we fain would persuade ourselves that the truth is itself the dream.

Nowhere does this principle seem to have received a more fitting or truthful portrayal than in that most weird and thrilling poetic creation "The Raven." The half revealed theme of that marvelous flame of inspiration clipped from the chandelier of resplendent genius, seems to be the imaging forth of the method in which the painful and troublous occurrences of our waking hours enter into the occupancy and possession of our dreams. Well chosen is the vision and well wrought the poet's description, to symbolize and portray the experience imposed by some gnawing sin or searching sorrow that has hung like a pall over the hours of waking, and at last with raven aspect has come stalking in our dreams into the halls of memory, thrusting its beak into the heart, while fated by and by to gather all the soul into its never-lifting shadow.

Still another feature of dreams tends to prove and find a colorable explanation in a vibratory theory of mind and form, namely: their character of riotousness or inconsistency. In dreams the censorship of judgment, the whip of propriety and consistency, seems to be withdrawn, and thought and imagination then run wild.

During waking hours recent or secondary vibrations operate in such a way as to put clothes on the naked mental images and render them presentable in the courts of conventional thought. This as elsewhere indicated, bears a

resemblance to the rendering of things agreeable by custom which are ordinarily not so: such a result being accomplished by borrowing vibrations from agreeable sources. At all events the primary or more or less instinctive and natural fancies or thoughts are kept in order and under discipline by the more newly arrived vibrations. In sleep the more recently arrived influences are withdrawn, and the master of proprieties being away, there spring up all manner of confusion and all sorts of grotesque and incongruous behavior.

It is possible, however, and even probable, that the final outcome of all the scattered and seemingly incongruous movement of the thoughts in dreams is one of ultimate order. It often happens that the grain of the wood of a tree grows tangled and gnarled in every direction, and yet the result is a tree no more lacking in symmetry of form than its neighbors of more regular growth.

In some way the highest symmetry of intellectual product is obtained by the workings of genius, which are not wholly unakin to dreaming.

UNDULATIONS ILLIMITABLE

When we consider the vast number of undulations required to record and perpetuate in the brain the sensations and the sensation-products of a single day, and then the practically infinite extent of the product of that number multiplied by the number of days in an ordinary lifetime, the startling magnitude of the result seems at first to offer an insuperable difficulty in the way of conserving the content of memory in terms of vibration.

The apparent difficulty will vanish, however, when the possible extent and rapidity of undulatory motion is taken into consideration, and this notwithstanding the fact that

only a very small proportion of the vibrations of energy can effect the sensorium.

In the transmission of light, the waves of the conducting ether are held by scientists, as we have seen, to attain a rapidity of 395 million millions per second, the number for red light, to 760 million millions per second for violet, and a number vastly beyond this for the transmission of chemical or ultra-violet, which though ordinarily ultrasensible, can still by certain means be brought within the purview of the senses. To these are to be added the large class of the newly discovered vibrations of radio-activity, and possibly the infinitely more rapid and subtle gravity vibrations, the parent of them all; and all of which may be traveling at the same moment through any given particle of ether. Yet utterly inconceivably great as these numbers may seem they constitute but an infinitesimal part of the vibrations that can take place in any particle of ether at one and the same moment of time.

But we may go further. Let us conceive the visible universe to consist of a hollow sphere, and every one of its twinkling stars to be a luminous eye giving out light and at the same time gazing at its fellow on the opposite side of the sphere, and directly through its central particle of ether. For a ray of violet light that central ether particle must dance in oscillations of 760 million millions per second for each one, or at most for each couple of these starry eyes. And this in but one direction on a single line, and that too for only a single variety of light.

Yet between these facing stars, and still exactly in the same line, this central ether particle must at the same moment keep further step to the vibrations of at least eleven other varieties of light, or twelve if the ultraviolet be included, with vibrations ranging from 395 million millions to 880 million millions per second.

Again we may take two other such sparkling eyes half way around the vault from these and looking at each other through this same central ether particle. This particle must now, while still abating nothing of its former motion, vibrate in a directly transverse way with the same rapidity and with the same multiple system as before.

Yet even all this can scarcely be called a beginning. These systems of vibrations must be repeated perhaps a hundred million times to embrace the entire host of twinkling suns that bestud the empyrean, and that too for the same moment of time.

And the end is not yet; for multiplied million-fold more of these glittering eyes than now appear, might bestud the limitless vault, and still each at the same moment of time look upon its opposite through this unspeakably busy particle of ether placed at the crossing of all the ways.

Similarly then at the seat of consciousness, or in the organ of mind, each atom or corpuscle, and scarcely less each complex molecule may by its infinite possible undulations be employed at one and the same time in a scarcely smaller number of sensations, thoughts, ideas, emotions, and other outcome of mental activity.

Our sense of hearing as already indicated does not take cognizance of undulations of greater frequency than forty-two or forty-three thousand per second. The rate and range of vibrations that reach the sensorium through the sense of taste have not been ascertained, nor have those of touch, but the presumption is that they are vastly more limited than those received through vision.

Sight ranges in its power of recognition, as already stated from 395 to 760 million millions of vibrations per second. But it is more than likely that even within these limits, there are vast numbers of vibrations that make no conscious impression on the senses. The vibrations of which

the other senses may be made cognizant are comparatively slow.

If then it be true that memory actually consists of vibrations, there would seem to be a sufficiency of cells and molecules in the most imperfectly equipped of normal human brains to keep a record of at least all the valuable impressions, not only of any individual for the period of his own life, but of those of all of his ancestry, back to the advent of human life on the earth; not to mention the illimitable numbers of corpuscles or electrons that may be present in the brain functioning in the mechanism of memory, but as yet unapprehended.

OF THE NATURE OF IDEAS

This brings us to a point in our discussion where a more extensive and detailed definition or explanation is required for certain terms already employed, in order that we may the more intelligently consider the nature of the manifestations that characterize mental activities in their various relations, and constitute the category of the functions of the nerve elements commonly embraced in the term, mind. These manifestations we have been considering as presenting themselves under the names of sensations, ideas, emotions and other like affections, together with their various interrelations. A closer analysis of some of these will now be undertaken.

It has already been set forth as one of the contentions in the vibratory theory of mind that sensations, perceptions, ideas and emotions, together with all other outcome of mental activity whatever are essentially one, and that they depend for their variety upon the different character of vibrations and vibration groupings that play upon the seat of consciousness, or the repositories of the subconscious, and also upon the order and intensity of such play.

This is not to say, however, that all, or even more than an infinitesimal part of such groups and combinations are ever made known to consciousness. Furthermore the great majority, if not all the groups so made known, are first formed in the subconscious.

As already indicated, it is the contention of the theory that an idea is not exclusively a visual image, picture or form, nor an image such as might be framed out of impressions derived through any single one of the senses. It is rather a group of interacting vibrations derived through several or all the senses. And all these vibrations of whatever kind or source must ultimately be transformable into one class of vibrations, in order that they may be combined together into the orderly products of mentation. It is obvious also that since thought-vibrations like all others must begin with and be given off from ponderable corpuscles, and since these corpuscles necessarily have position, the basic framework of the idea must have form.

If a particular idea or sensation derived through one of the senses is found to have the cast of another, say an idea derived from sound is found to have a color cast, or the converse, it must be either that the vibrations of hearing and those of sight have been translated in the neurons, the one into the other, or else that all have been transformed into a different but common character of undulation. Of these alternative views, the latter would seem to be the most reasonable. All vibrant groups from whatever source derived must be inter-translatable. This feature of the subject will be recurred to when we come to treat of the nature of sympathy.

We have previously considered how it may be that vibrations that reach the brain through various avenues, in the form of sensations, might build up ideas into very complex structures, and clothe them about with a great diversity

of accessories. But before that stage is reached many distinct changes and modifications must have taken place in the groupings of these undulations. A mere sensation must be without form or shape to the apprehension of consciousness. It is simply the ring of the door-bell, and it may be anybody's ring.

But when numbers of them begin to play upon consciousness in definite order and to join others of like character in order to form groups and arrays, they then become perceptions or other mentation-products and should no longer be denominated sensations.

When sensations combine to give rise to an image in the organ of mind, whether such image is a visual form, that is, one derived through the sense of sight, or one derived from the senses other than sight, or a modification or derivative of all of these, we call this image properly an idea.

An idea then may be defined as such a grouping of sense waves or of their modifications as is capable of producing in consciousness a form of suggestive representation corresponding to an external thing, that is, a thing external to consciousness. It is not at all to be doubted that among the neurons such groupings are to be found in numbers practically infinite, only a few of them, however, being at any one time brought into consciousness. The vast majority of them remain persistently in the subconscious.

EMOTIONS

An emotion is simply an idea into the complex structure of which has been woven a greater or less number of nerve vibrations of the class that otherwise is usually employed in any kind of expressive movement. This movement may be such only as is manifested by obvious muscular changes of position, or by a disturbance of any of the functions of the body, such as circulation, breathing or gland secretion.

In short, an emotion is an idea plus any kind or degree of involuntary movement associated with it and caused by it. Hence the term, "emotion," which signifies a moving out.

There are those, however, who maintain that every idea is accompanied by and correlated with a certain quantity of muscular movement, and the contrary is not easy of demonstration. In the beginning of embryonic life, muscle and nerve or those plaques that are destined to be developed into muscle and nerve respectively, are so intimately associated in the process of development that they are almost indistinguishable the one from the other.

And even after the most complete differentiation to which they ever attain, muscle can supply its own contracting and relaxing impulse. It can probably regulate also its own rhythm. On the other hand, neurons and probably axons in their most mature stage may still retain the muscular faculty of amoebic movement. Every idea, therefore, owing to the kinship of muscle and nerve, may be in some degree associated with muscular movement, even if so slight that the fact is in most cases not discerned. And possibly muscles have a shadowy power of thought and a shadowy consciousness.

If the foregoing contention be true, an idea differs from an emotion only in degree; an emotion being nothing more than an idea of larger growth or greater expansion, and agreeable or disagreeable, according as it corresponds in a broad sense of the term, with the well-being of the individual, or the opposite.

NATURE OF ASSOCIATION

At this point, in view of the deep obscurity that rests on the physical processes concerned in the association of

thoughts, ideas, and the like, we may venture to invoke fancy or imagination to gain some sort of picture or scheme of the play of forces that in the brain and in its neurons, most likely perpetuates the elements of mentation, and when need be, marshals them in consciousness. It seems also that more or less illustrative examples can be found in the appearance presented by material substances when undergoing various transformations.

Thus the flitting shadow lines across the surface of mother liquors when these are active in precipitating crystals; and what is technically known as, "forked or branched lightning," darting across the clouds in the tropics; or the movement of participants in certain complex dances, may offer something analogous to the probable plan of movement of the impulses that arouse dormant impressions and reproduce them with their various relations in consciousness.

Let us suppose, for example, that in one or more of the molecules of a neuron, or in a neuron of one or more connected groups are stored the vibrations that stand for red. These vibrations may have been derived from a rose, a crimson drop of blood, or a sunset, and every one of them must have been modified by coming within the influences of vibrations proceeding from associated and similar objects either since or at the time they were recorded.

If, for example, it happens that the vibrations have been received from a rose, then the leaves of the bush, some relations of the time or space element, or any other of hundreds of associated features may have mingled their vibrations together, and these mutually modified make up in memory the assemblage known as the idea of a rose, in which, however, red predominates.

A fresh object is now presented whose vibrations likewise enter into the impressions made on consciousness

that belong to the order of red, or whose predominant force is of the nature of red. All at once the reenforced vibrations will arouse in consciousness the idea of some red object, say of this rose, which was slumbering in the memory. And with the vibrations which the awakened idea of the rose imparted will come such as accompanied those of the rose in the process of the original impression, and which were associated with them in time and position.

In this way that part of the complex idea corresponding to the leaf may be made to appear; then the thorn followed by other accessories, one after another, the vibrations coming into consciousness in the order of the facility of their reinforcement. Or the troop of incoming vibrations may mostly have the cast of the sunset, and then stored vibrations circling or lingering in and among the neurons and constituting the record of a sunset previously observed will reveal themselves to consciousness, and bring with them, one after another, such other vibrations as enter into related ideas, or such as form connecting links between the principal idea and its various subsidiary groups.

It may then be that to a stranger in a strange land the association will call up the idea of a faraway home, or a distant friend, who in times past has joined him in watching the fading glow of the setting sun.

As the electric current flits along over tropic clouds, shunting here and dividing there, so the memory-waking current travels where the pathway is easiest, and stirs into renewed activity the subtle corpuscles whose undulations are most like its own.

AN EMOTION ANALYZED

A detailed schematic presentation of the process of building up an emotion from an idea, with the incident

marring, crippling, or enriching which it may sustain, may serve to supply a clearer understanding of what it is here sought to impress.

Let us suppose one to be in possession of an object, even though indifferent or commonplace, that happens to be of an agreeable character. Say that this object is a painting, and further that the undulations that go to make up its mental image or idea have met with a favoring response in consciousness. He loses that painting or it is destroyed. At once he feels that there exists an unpleasant void or vacancy in the assembly of mental experiences of which its possession has formed a part. There is a vacant seat by the hearth-stone; an empty chair at the table in the feast of memories. Something is felt to be lacking, for a time at least, in the way of accustomed pleasant influences. The painting can no longer send the required pleasant undulations to reenforce its agreeable image already recorded in the mind. Thereupon a more or less disagreeable mental experience results, namely: the presence and influence of the blemished, maimed or otherwise impaired idea; and in that mildly crippled state the experience may be laid away on the shelves of memory. The power to realize such experiences is inherent and instinctive; the babe of a week may possess it.

Later, although the record of this experience may seemingly have been lost, there comes to one in the course of events, a large number of similar experiences. Very many of such records having been connected and stored away together, by reason of being constituted of undulations common to large groups of associated neurons, enter habitually into the make-up of one's state of mind. More and more with each new accession, the undulations which constitute the marred and crippled ideas overflow into the motor neurons, always leaving in their wake traces of their devastation.

And thus in the secret storehouse of memory are gathered and crowded the crippled and deformed groups handed down from the past, and projected now and then into consciousness. Being again and again thus re-enforced, stress is added to stress, until at last some new wound, some fresh hurt, tears away the bonds of restraint, and permits the combined and pent up energy to break forth like the winds from the cave of Aeolus, in an overwhelming storm of emotion.

We have some one very dear to us—say a mother—whose idea has been linked and enlaced with our inmost being by innumerable agreeable acts of kindly care, by smiles of approving sympathy, by tears of pity, and beaming looks of love, until an affectionate response has taken deep root in all the sources of expressive movement. A thrill comes unbidden even if only the name is spoken. It comes to pass that we lose our mother in such a way as that our experiences impress us with the assurance that the loss will be for long, and the void she has left will be slow to fill. She is claimed by death.

We have of course never before known what it is to lose a mother, nor directly realized the situation, yet all at once we are overwhelmed with the deepest grief. Evidently this grief is produced only indirectly by the loss of our mother. That was but the exciting cause; for how could we feel to grieve so bitterly for that of which we had never before had any experience.

The primary, the potential cause of the sad and painful feelings thus experienced is the mustering and marching forth of a train of marred and withered ideas and emotions that have hitherto been lingering massed in memory, accumulated there through all the sad partings and bereavements of life.

The proof that this is the case is found in the fact that

nearly if not identically the same effect might have been produced by a false report of the death of our mother; such a report being sufficient to open the floodgates of marred and disfigured ideas and emotions. Pleasant and agreeable emotions, or emotions of any other variety or cast, may be developed in the same way.

INITIATION OF REMEMBRANCES

It is not difficult to conceive of the stirring up of memory vibrations by the invasion from without of others possessed of the same character as the original exciting agents, or even approximately the same. But what can be the exciting cause of the activities that thoughts and reminiscences are constantly taking on without any apparent external influence? It does not avail to contend in favor of these activities that they seem to be spontaneous, for we feel that they cannot be so.

It is well known that the initiation of such activities is characterized by the setting up of an electric current, and a flow of blood to that part of the brain that has just become active. But if the electric current and the flow of blood are the immediate cause of this initiation, then what is it that causes them? If they are merely the effects of thought activity they explain nothing. It seems to be a more reasonable explanation, as already indicated, to assume that the thought or memory currents never rest; and that when in their circuits two or more of like nature and character combine, they are enabled to impress consciousness by reason of the added vigor.

The fact previously referred to that the fine brain cells or neurons, which ordinarily have no axons, under certain conditions send out or project prolongations of their own bodies, string their own wires so to speak, in order to

communicate more fully with their fellows, indicates two things of marked interest. One of these is that the neurons may be informed by direct emanations through space and without communicating tubules, and the other that intelligent work, and possibly complete thought can be carried on by a single disconnected neuron. Furthermore, this thought the neuron seems capable and desirous of imparting, and spontaneously seeks to impart. Evidently these neurons would not send out their prolongations unless they could realize that companions were in reach capable of receiving their message.

The spontaneous thought or idea, or the seemingly spontaneous one, must then originate in the subconscious, and move upon the stage of consciousness by virtue of its own forces. Indeed we often realize that a thought or idea is just about to break into consciousness; we can feel its approaching birth. The Will, whether it act freely and of its own initiative, or in response to determining forces and conditions, cannot call into being an idea not yet formed, for it cannot act upon the non-existent.

That one idea follows another in a continuous train out of the subconscious is a fact of universal experience. But the thinker does not know what thought is next to come; it is apprehended only when it has appeared in consciousness. The will does not draw it out, except that by resorting to or selecting suggestive associations, the elements of which are already present, we can send kindred vibrations down into the subconscious and recall the desired word, idea or circumstance, when we are moved to try to recollect some past event. Yet it is not to be forgotten that before all else, comes the inclination, the desire.

Ideas then in their ultimate organic origin are practically automatic, instinctive or intuitive. They grow up out of conditions in the subconscious mind that we cannot direct-

ly control, and the ideas that reach the domain of consciousness are but an infinitesimal part of all that form or are formed in the subconscious. They are mere sparks from the anvil; mere crumbs from the feast on the groaning tables spread by instinct; a mere by-product, to however admirable a use they may sometimes be put. But this subject will need to be again considered when we come to treat of the nature of the Will.

MEMORY AND CONSCIOUSNESS BEYOND THE GRAVE

The wide prevalence and stubborn persistence of the belief that memory and individual consciousness will continue after death entitle such belief to scientific consideration. From the viewpoint of science, it does not appear impossible that memory and consciousness should persist after death, but it does appear infinitely improbable.

If it be true that rudiments and reversions in man are due to the fact that in the course of evolution he has passed through various lower forms of life, then these can be nothing else than organic memories, unless some of the essential ponderable elements of lower forms have been transmitted to us, and that too while still possessed of their former activities. If the gillslits and the Wolffian bodies of the human embryo are not based on any native or inherent tendency of either the vital corpuscle or the vital energy, while these are entering into and controlling the development of the embryo, then that tendency can be only a bare memory that for millions of generations, it may be, has impressed vestigial characters upon the later orders in any given line of descent.

We might here also inquire whether or not the production of rudiments, reversions and other vestigial traits necessarily involves the expenditure of energy. If such is

the case the energy employed cannot be divided indefinitely without diminishing the size of the parts, and in this as in other like cases, it is not easy to perceive how even rudiments and reversions can be produced except by the constant drawing of the requisite energy from external sources.

A second possibility would be that vital corpuscles are modified or altered in their tendencies as they pass from an essential or basic vital relation in connection with one class of animals to the same relation in other and higher animals. In that case it would need to be supposed that each time a corpuscle or a facultative group of corpuscles passes into essential connection with the life of any animal or vegetable it receives a definite impress thereby, and that such impress ever afterwards persists, and is not wholly obliterated while these corpuscles are passing into or through subsequent forms.

It would indicate also that an imperfect though distinct tendency is impressed upon and remains with such vital corpuscles, which causes them to have a disposition to travel routes they had traveled in previous forms of life, and to lead each individual embryo to make a feint at producing the various forms of life with which such corpuscles had been previously connected.

Still another alternative would be that vital corpuscles as they exist in nature's limitless reservoir, have an inherent tendency to pass through all the vestigial forms observed in the course of embryonic development in the higher orders of life, and that the class of corpuscles adapted to each successive stage of life is, in the march of evolution "seeded out" by the parental germ-elements provided for such particular stage. But this may be treated more at length in another connection.

However the notion of memory, in the sense of the

preservation and continuance into another and conscious life, of mental impressions acquired in this, seems wholly without scientific support. As before indicated, even if reincarnation should occur, it is infinitely improbable that the same elements could ever again come together in the formation of a new individual, a result which would be indispensable to a conservation or a restoration of individual personal memories.

Nor is the fact that our projection into a future life, as individuals conscious of what has occurred in this, is almost universally desired, any evidence that such a life is to supervene upon this. Unlimited are the desires and hopes entertained by men that are never fulfilled or realized. Reflection readily reveals to us the artificial character of the foundation of any hopes we may have, of passing with a conscious individuality into another life beyond the grave.

In the first place with the great majority of men such a destiny is not really and fully desired or desirable. The unpleasant must be remembered with the pleasant experiences, if a future life is to correspond with prevailing desires and hopes. Yet how few are they who have not often had experiences in life whose only mercy was the confident assurance that they must pass away and be measurably forgotten. Absolute oblivion would be preferred by the vast majority of men, to a life in which all painful memories should be ever present even though all the pleasant should likewise be recalled.

Nor do the grounds of the prevailing desire bear investigation. The mother feels and proclaims that without the presence of her children there could be no heaven for her; forgetful of the fact that if her own child had been removed from its cradle before she first rested her eyes upon it, and another had been put in its place, she

would have loved that other exactly as her own. The husband or the wife might have had another companion, if either had gone to the other school, the other church, or the other dance.

It must be conceded that there is a desire, a "will to live" possessed by all living things both animal and vegetable, otherwise they would cease to live. But aside from this the desire for future life is almost wholly a matter of association. Taken all in all it is most reasonable to conclude that neither science nor philosophy give any apparent support to the notion that conscious memory persists beyond the grave.

It is true that the instinctive "will to live" as well as agreeable associations, as a rule, make death unwelcome. With a world's approval the poet wrote:

For who to dumb forgetfulness a prey,
This pleasing anxious being e'er resigned,
Left the warm precincts of a cheerful day,
Nor cast one longing lingering look behind?

Last night we enjoyed a sound oblivious sleep and to-day we do not regret it. The rather, we look forward with pleasure to a repetition of it to-night. We likewise know that in some form we have been in existence from all eternity, yet except for a few recent years all experience of that limitless period lies buried in oblivion. But who regrets not having been born sooner? Most men would preferably have come later on the scene of life and later in the world's history. If then we have existed through an eternal blank in the past without regret, why should we look forward with dread to an eternal sleep in the future?

SYMPATHY AND SUGGESTION

The phenomena of sympathy and suggestion, which are closely related in their nature, also find a plausible explanation in the undulatory theory of mind. The amount of brainwork that is consciously performed, as already indicated, dwindles into nothingness when compared with the work that is carried on unconsciously or sub-consciously.

Since, as we have learned, there is a constant tendency of the energy of ideas to flow over into muscular movement, and thus become emotions; and that emotions consist of ideas combined with distinct physical movements, we risk little in assuming that muscular movement of every kind is a correlate or metamorphosis of thought or thought-stuff either conscious or unconscious. Indeed a correlation of this kind is a long established fact of physiology.

The example of the slight vibrations caused by troops of soldiers marching over a bridge while keeping time to music being transformed into a dangerous swaying of the bridge; and the example of the ripples on the surface of the ocean being merged into great waves under a continuous wind, may be utilized again to show how it is that diminutive vibrations may be built up into others of greater magnitude and which are, in all probability, multiples of the smaller ones.

To the foregoing illustrations might be added still another, though it must be confessed that it rests on a basis in a high degree hypothetical. The support referred to is found in the possibility that the vibrations manifested in the form of heat, light, electricity and the like, communicated to the ether by the motions of the traditionally recognized coarse atoms of matter, are in reality compounded of the finer vibrations of the electrons now held to be the ultimate elements of such atoms.

It does not appear to be any more impossible or unreasonable that the vibrations of the electrons should be changed or combined into the motion of the coarser atoms, than that the tremblings of a bridge due to the rhythmic tramp of soldiers should be combined into the destructive oscillations of the bridge.

And though we may have met with no example of the resolution or decomposition of these great waves or oscillations into the finer vibrations out of which they were built up, except in the case of the transformation or resolution of mass motion into light, heat, and the like, we cannot but feel that they must persist so involved and so implicated. It appears, therefore, neither impossible nor unthinkable that the resolution or transformation of the coarser vibration groupings, such as those of sound or various physical movements into the finest vibrations of which they are constituted, should be effected in the neurons.

These finer vibrations are implicit or folded up in the grosser ones; and if they are susceptible of being mutually or reciprocally decomposed and recomposed, separated and again united, the fact supplies a key to the solution of many difficult psychic problems.

For example, suppose that we assume that certain groupings of vibrations, taking appropriate form and direction, determine, or we may say constitute, muscular movements. The muscular movements thus produced, however extensive they may be, are in all probability correlates or common multiples of the vibrations and vibration groups that produced them; and the two classes of movements are reciprocally intertranslatable. The two forms are in turn correlates of, or at least, closely related to nerve force vibrations.

Accepting this conclusion as correct, we obtain a some-

what restful though dim conception of the way in which any particular movement will be followed, in the observer, by a like movement, or at any rate by a responsive movement and its associated feelings.

Say, for example, that I perceive some person or even a lower animal engaged in the act of yawning. The energy conveyed to my neurons by the observed act of yawning is there decomposable and translatable into the same character of undulations that in the brain of him who is yawning gave rise to the act on his part. Therefore, when any such vibrations or vibration groups impress my brain through any of the senses, they arouse there the same character of vibrations that originally gave rise to the act in the person or thing observed.

The case is the same with the act of laughing, smiling or weeping, with expressions of joy or sorrow or any other outcome of mentation that admits of expression of a kind cognizable by the senses. The principle involved is the basis of all involuntary imitation. The impulse that produces or elicits the act, the muscular movements that effect it, the impression it gives to the beholder and the beholder's own movements resulting from such impressions, are all intertranslatable through the common medium of basic vibrations.

If we are willing to admit that tones of voice as well as expressions of countenance are intertranslatable with the vibrations that determine their production, we can easily perceive how words angrily spoken bring an angry response, how it is that a soft answer turns away wrath, and even how it is that all the world loves a lover. And thus it is that a deeper interpretation may be given to the estimate placed by the genius, Delsarte, as by so many others, upon the quality of voice and tone as well as movement and expression as being indicative of character.

If one expresses himself in harsh laryngeal tones, and thereby betrays harshness and coarseness of nature, it is because the vibrations that are the primary or proximate source or origin of the constituent force-elements out of which such expression is formed are themselves gross and harsh, and proceed from harsh corpuscular elements or structure. Therefore, all the actions and all the expression of such an one, when spontaneous, will show in their harshness a general logical symmetry and consistency.

And in fact the same rule will commonly apply to such a person's physical organism. On the other hand, the man or woman who employs soft palatal tones and whose words seem to linger with a sweet savor in the mouth, speaks from the abundance of the gentle vibrations that characterize and constitute the stored experiences of life in the archives of the brain, and thereby reveals a fineness of physical fiber as well.

Indeed it is not impossible nor even improbable, that nerves of nutrition or so-called trophic nerves or centers have their offices of nutritive control likewise influenced by a kind of sympathy. It has often been remarked that after many years of association husbands and wives come to resemble each other in appearance. It is also a matter of common observation that children born of foreign parents, or who being born abroad have migrated to other lands, in the course of time, come to resemble, in expression, those with whom they associate in their altered surroundings and that, too, in a way that can hardly be accounted for by change of climatic influences alone. Furthermore, every one knows how certain occupations and callings work their influence on facial and even general bodily expression.

CROWD PSYCHOLOGY

Closely related to sympathy and suggestion is the influence of what is commonly known as crowd psychology.

The great facility with which large masses of people can be aroused and led into an intense state of excitement is a matter of universal observation or experience. The declaration that, "Where two or three are gathered together in my name there am I in the midst of them," words ascribed to the Carpenter of Galilee, is a recognition of the principle of crowd psychology. Even in a meeting of as much as a single pair of unfamiliar people, each influences the other by his mere presence.

Lower animals are influenced in a similar way. A strange cow entering an ordinary herd will cause a change in tone of voice and in movement of the entire number, and in this way a herdsman of sharply discriminating ear can readily discern by the altered tone of the lowing of his cattle that such a stranger has entered his herd.

Crowd frenzy seems to be little more than an exaggeration of the state produced among smaller numbers by suggestion or expectant attention. Apparently it may be fostered both by the mutual inter-translation of language and movement, and by direct emanation of mental vibrations passing from one brain to another. This produces a tense activity resulting in a general overflow in the form of more or less uncontrollable emotion.

Helped out by the aid of expectant attention, where the subject looks for and desires the resulting exaltation of feeling, it produces the reckless frenzy of the Malaysian zealot, the wild excitement of the snake worshipper, or the sun worshipper among American Indians, and similar conditions among other uncivilized races, as well as what is known as conversion among Christian peoples. In every case, the cause and the processes are the same, and the result is attained mainly by the mutual imparting and collecting of brain vibrations through various methods of communication. Other things being equal this influence

probably increases in geometrical ratio with the number of persons involved.

BRAIN EMANATIONS

Pursuing this subject still further, we shall find convincing evidence that emanations apparently more subtle than any of the forces with which the special senses have to deal, or even can deal consciously, may be the medium through which one mind exerts an influence upon another and in a greater or less measure determines its workings.

Along with other obscure and apparently mysterious phenomena of mind, that seem to a certain extent susceptible of explanation on this principle is that of mind reading or telepathy. It is not at all a rash surmise, nor even an extravagant claim that there exists in nature a world of subtle undulations operative within and upon the organ of mind, which with most of us never come within the purview of consciousness.

That objects of various kinds give off delicate vibrations, without end and without number, which those who are blessed with sight never perceive, is clearly indicated by the fact that people totally blind have been enabled by means of the sense of touch alone to accomplish the most delicate distinction of colors. This is doubtless effected by the recognition of undulations that must be present and active with all minds, but which are perceived only under exceptional conditions.

How reasonable this conclusion appears, an observation made by every one who has watched the change of day into night, while riding on a railroad train, bears ready witness. During the brighter part of the day the glass of the car window apparently evidences no reflection of any of the objects within. But as soon as night comes on and

darkness begins to prevail, every pane of glass is transformed into a mirror presenting a more or less vivid reflection of the objects in the car.

This is not because a larger number of the rays of light proceeding from the objects thus imaged are being reflected now than during the day; on the contrary, such rays are far less numerous. The rays given off from the objects in the full light of day are vastly more abundant than those given off in the twilight, or later by artificial light, and a correspondingly larger number of them is reflected.

During the day, consciousness was dazzled by the flood of vibrations that came into the car from without, and was not impressed by those that were reflected from the window panes; though these must all the time have been spending their force upon the neurons concerned in vision.

Comparatively few persons are prepared to realize how much pain can be inflicted by the continued operation of purely normal forces, until they have witnessed the sufferings of those who have for a long time blocked the pathway to consciousness by the habitual use of opium, and then suddenly left off the use of the drug. The cause of this pain is little if anything else than the tearing away or absorption by the leucocytes, of the waste and used-up tissue cells, a process which under other circumstances might be not only painless but even agreeable.

But now nearly every nerve in the body will begin to ache with pain well nigh intolerable. And yet the same activities, the same tearing away of debris, in short all the same causes of pain, though all the time in full operation, are in normal conditions not observed, or at most, observed as a source of uneasiness of only a very moderate kind.

There are individuals who are said to possess the power

of colored audition; that is, a disturbance which others perceive as sound, they perceive as color. This may reasonably be supposed to be due to a peculiar power of translating or decomposing the sound waves by a subtle unconscious analysis into the still finer vibrations, that are the ultimate factors of the vibrations that produce the sensation of sound; possibly into the ether vibrations that are the elements of light and other expression of energy embracing the finest movements. And again it may be questioned whether or not a nerve of vision may, in the process of embryonic development, have strayed in among the nerves of hearing.

Under the influence of hydrophobia, and perhaps some other affections, the sensibility of the deaf has been known to become so exalted that they could hear acutely; a result evidently due to an increased sensitiveness of the neurons and not to any alteration of the conducting medium.

Besides the vibrations given off as brain emanations here suggested, there are other multitudes with which all space must be tremulous, but which have never yet been brought directly through the medium of sense into human consciousness. And in addition to the familiar forms of radiant energy, floods of tremors having their origin apparently beyond the visible universe, though entirely inappreciable to consciousness directly through the senses have been abundantly demonstrated through instrumental means; and these under some conditions may influence consciousness.

Many of the lower animals possess an acuteness of perception unknown to human beings, and in many respects they surpass men by far in refinement of sensibility. Thus the sense of orientation that guides animals in homing is very weak in man and often apparently non-existent. On the other hand, turtles, frogs, and other amphibious ani-

imals are enabled to scent, or in some other way to realize the location of so neutral a substance as water, even though miles way. Numerous marvels of a similar character are reported of various other animals, and especially as regards insects.

The discovery of wireless telegraphy recently made in the domain of physical science, a thing which only a few years ago would have been regarded as the greatest of marvels, serves strongly to support the probability that brain emanations are everywhere prevalent. And it may not be amiss to repeat in this connection that when once energy takes the form of ether waves, it apparently goes on through the pure ether forever.

In view of the foregoing and a great array of similar facts, may we not with reason conclude that the mind is all the time receiving from the external world countless subtle influences, subtle waves of the nature of those that produce sensations, but ordinarily not of sufficient intensity or of the proper pitch to be consciously recognized?

Assuming further that in man as well as other animals, there is a delicate sense as yet unnamed, capable in certain individuals of being consciously affected by these emanations, we should have an explanation of mind reading or telepathy.

MIND READING AND TELEPATHY

The claims of mind reading have encountered much scepticism; and doubtless too much has been claimed for it, not to mention the almost illimitable fraud and trickery it has been invoked to conceal. Yet no fact in science or history has been more completely and conclusively proven than the existence of telepathy, insofar as is necessary to establish the fact of the transference of both motor and

sensory impulses, without the employment of any specialized medium or agency of sensation.

In most cases communication made apparently by direct emanation from brain to brain is the form observed. Thus, the mind reader, so called, will discover a hidden object under circumstances in the highest degree calculated to baffle and mislead; will sing a song silently thought over by some one near; while practically completely blindfolded will drive a team of horses at a rapid pace through a crowded street, guarding against collision as effectually as the most expert driver with all his faculties free. In order to accomplish the latter feat he will require to be kept in contact with the prompter merely by his hand, foot or knee, and that through shoes or clothing.

If we can accept as true what has already been set forth, this need not seem so very strange nor its explanation so difficult. Assuming that the undulations or groupings of undulations in the mind of the active agent or prompter, have such force as to extend to and impress the exceptionally sensitive neurons of the recipient mind-reader, and that these vibrations are then discharged to the muscles of the recipient, or that they guide the discharge of the mental vibrations of the mind reader as these vibrations would have been discharged into his own muscles, if the impulse had been original with him, there is nothing more strange or inexplicable in the phenomena than there is in the fact that our own muscles are obedient to the nerve impulses that direct them.

EXPERIENCE OF MISS MOLLIE FANCHER

There are, however, many recorded facts of this class still more remarkable, and still more difficult of belief, but yet vastly better authenticated than the marvels claimed

for any system of theology that has ever existed. In this category may be placed the well-known case of Miss Mollie Fancher of Brooklyn, who is still living, but with the entire loss of her marvelous gifts.

This girl, it is just to say, made no pretensions to occult powers, rejected all notions of spirit control, and even sedulously endeavored to hide from the public all knowledge of her wonderful endowments.

As an example of her powers, it is related that on one occasion a committee of gentlemen, one of them a physician of high standing, who had been her medical attendant for years, another her pastor, Doctor Prime, then editor of the New York Observer, and a man of national reputation for probity and truthfulness, together undertook a test of her ability to read printed words enclosed in envelopes.

They sat down together at a table, blindfolded, and one of them removed a leaf from a copy of the Congressional Globe. This they cut into small pieces which one of them gathered up and put into an envelope and sealing it, handed it to another of the party who put this envelope into a second which he also sealed. This was repeated by the third member, so that the clippings remained enclosed in three sealed envelopes, one within the other.

In order to prevent any impressions of the contents from being made on their minds, and to eliminate the possibility of mind reading, the paper was not read nor looked at by any of the party before the test, and the work of selection, clipping and sealing were all effected by touch alone.

The clippings, with their triple envelope, were then submitted to Miss Fancher, who was at the time totally blind, with one of her hands fixed behind her head in a condition of cataleptic rigidity. With her free hand, the right, she grasped the package and held it for a brief period against her forehead. Then putting it to the back of her

head, and holding it there in her left hand, she, with her right hand, wrote out what purported to be the contents. Every now and then as she progressed, she would make a dash to indicate a blank, and then proceed with her writing. When she had finished, the visitors took the package, returned to the room where it had been prepared, opened it, pieced it out, and then compared it with what Miss Fancher had written. To their astonishment they found the interpretation perfectly accurate, except that some of the pieces were missing, and to these the dashes corresponded. Looking further, the committee found that they had inadvertently let the missing pieces fall onto the floor while preparing for the test and had failed to put them into the envelopes.

True enough this is not mind reading; but it serves to illustrate the action of waves ordinarily insensible and unsuspected upon a most delicately organized brain.

We have in this case to suppose that delicate and subtle undulations perhaps related to radium emanations were given off by these clippings and the printed letters on them, and that these undulations reached Miss Fancher's mind, somewhat in the way colors make their impress on the neurons of the blind when such colors are perceived by the sense of touch.

We must further suppose a brain so sensitive that it could focus the letters and the bits of paper in much the same way as the eye does visible objects, or as the ear measures distance and discerns direction by the difference in the vibratory forces of sound emanations. Being held up all at once before the mind's eye, they were sorted out and fitted to each other in a manner similar to that pursued by the experimenters themselves in verifying the translation.

THE WATSEKA WONDER

A case more distinctly in point as an instance of telepathy, and that of the kind styled by the French "*Telepathie a trois*," was that of Lurancy Vennum, "*The Watseka Wonder*," which transpired in the seventies of the last century about the time of the greatest vogue of spiritism.

A family by the name of Roff, living at Watseka, Illinois, had lost a daughter not yet grown, named Mary, who had been a cataleptic. In a distant part of the same town lived a family of the name of Vennum. This family had a daughter named Lurancy, who was less than three years old when Mary Roff died, and was only acquainted with her through reputation. At the age of twelve years, Lurancy Vennum began to experience trances and paroxysms that are described as "fits" and also to develop a double personality or double consciousness. Conceiving the notion that she was Mary Roff, the girl who had died nine years before, Lurancy demanded that she be returned to what she claimed as her rightful place with the parents of the dead girl; at the same time speaking of them as her father and mother. Her request was at length granted as apparently the only means of preventing her from pining away to a fatal end.

She joyfully entered into the vacant place, and it was soon demonstrated that she had largely succeeded to the memories of the dead girl, though as it appears exclusively of such only as her foster parents had at some time had knowledge of. She began at once recalling minute particulars of various circumstances and adventures in the life of Mary Roff as if they had been actually her own. Many of these her foster parents had quite forgotten until they were in this way recalled to their attention.

These revived or rather awakened impressions and memories were assumed by her spiritist friends to be transferences from the spirit of the dead girl. But a far more consistent and scientific explanation can be offered, based upon physiological or psychological principles fairly well established. The explanation of this case that a liberal psychology would offer, would be the following: "The Wonder," for the time being, owing to some recondite changes in her organism, became abnormally and delicately sensitive to the vibrations emanating from the neurons of the parents of the dead girl, and with which vibrations, at the same time, the neurons of the parents were perpetuating the memories of happenings acquired by them in connection with the dead girl while she was living.

These vibrations Lurancy was capable of perceiving and interpreting at second hand as they emanated from the brains of Mary Roff's parents, and that too with marked accuracy and particularity, though these parents themselves were in large part unconscious of possessing them, and unaided could probably never have recalled them.

To such as are willing to accept this explanation, it will afford a pertinent argument in favor of the view that memories are persistently active in the brain cells or neurons, and are in reality never entirely dormant or quiescent and displaying activity only when aroused by agents from without the neurons.

We may safely affirm that the only limit to insight of the character here described is imposed by the coarseness and obtuseness of our nervous organization. If once brain vibrations can be communicated to the ether, distance counts for nothing except in the way of diffusion. Transference to the ether once accomplished, thought waves may then keep pace with the waves of light and electricity. Indeed it seems that they must do so, since there appears

to be but one rate at which disturbing waves can travel through the ether.

If then, thought waves can take the form of ether waves, as does the light given off by the glow worm, or even that from decaying wood, they must add something of disturbance though infinitely little it may be to Sirius and Aldebaran and every other star in view as well. Nature everywhere in the wide realms of space must be vibrant with messages struggling for revelation, and which we might be all the time receiving if only our nervous organization were sufficiently refined and sensitive.

We have seen that there are cells in the brain without axons, or connecting tubules, which yet display spontaneous activity, and on occasions throw out prolongations of their protoplasm—string their own wires one might say,—in order to seek information from others, and to impart their own messages and suggestions. Is it unreasonable then to conclude that possibly every single neuron is capable of receiving impressions and making communications through the instrumentality of direct emanations?

Nor is it fanciful or unreasonable to believe that emanations are given off through these low-whispering undulations that are continually influencing for good or ill, those to whose lot it has fallen to be our associates. An atmosphere of subtle influence emanating from the neurons of all our brains, and strengthening or counteracting as the case may be the undulations in the neurons of other brains which are concerned in a corresponding function, is not at all an impossible condition. Whosoever, therefore, can develop a spirit of evangelism, whosoever is able to go about among his fellows "singing and making melody in his heart," is ceaselessly exerting a silent influence for good through the gentle vibrations that pass from brain to brain, and wake in the hearts of his associates kindred impulses. And thus

it may be that kindly thoughts and kindly sentiments as well as kindly words, coming from the fulness of a benevolent heart, are but forms of prayer; and prayer, moreover, that never goes unanswered.

TELEPATHY IN LOWER ANIMALS

Seeing how far the lower animals surpass man in the acuteness of special sense, how deficient they are in the means of communication by articulate language, and consequently how great the need of some form of telepathic communication, it ought not to be surprising if it should turn out that such an endowment exists far more highly developed in the lower animals than in man.

It is possible that many species of lower animals, and especially insects, may read from each others' minds as from a book such records as they contain. Without, however, going into the voluminous evidence pointing to such a conclusion, it must here suffice to say that both well established facts and careful reasoning afford it a strong support.

THE WILL

Breaking somewhat abruptly, perhaps, into the order of our investigations, we may here essay a brief excursion into the realm of the Will; casting a glance at its nature, tracing its connection with the class of vibrations we have here been studying, and briefly considering its relation to the betterment of the moral condition of the race.

What is Will? Is it in any sense an independent entity, free to exert control over the other faculties of the mind, and the activities of the body, or is it the expression of a mere predominance of inclinations and motives which themselves have their basis in the deeper instincts?

The consistent evolutionist ought to be able to find Will among the possibilities of matter and force. And just as it was heretofore insisted that soul-stuff or the vital energy, whatever that may be, must either be identical with the common force in its nature or else must itself be drawn from a reservoir of vital energy as wide as the range of life; an energy that is everywhere present and everywhere prone to be transformed into the life of new beings; in like manner what is known as Will, if a thing apart, must exist everywhere as a property or an attribute of the vital energy. The Will of the ancestor cannot by any possibility be indefinitely divided to furnish a Will for each new being, nor can there exist the power of producing a Will except it be out of forces already abundant in the realm of nature, and prone to enter into such a formation as the Will whatever that may be. If all life is one, then wherever there is life there must be also what we recognize as Will.

Will must be found in all lower animals as well as in plants. And in spite of all that may be said, Will in the lower animals must be essentially of the same nature as in man. "But in what guise," it may be asked, "do we find Will, or its counterpart in plants?" I would answer, in the tone or tension of the albuminoid particles that correspond to the leucocytes in man.

And in man, are there separate cells in the brain, which are the particular seat of the Will, or does it wander from cell to cell and go out and in as an independent energy to direct the contraction and relaxation of the muscles, or the course and character of the thoughts in the brain? Does it know of itself what to do and how to do it; or does it need to inquire of intelligence and conscience in order to know what is wise, right and prudent? If it is independent in its operation, if it is acting blindly, it is as apt to go wrong as right, as apt to do harm as good.

For my own part, I can see in Will only the tone or tension of muscular or nervous activities, and regard it as not to be separated from these any more than speed is to be separated from running. It represents merely the predominating forces of inclination, and the greater weight of incentive. If the incentive forces all lead in one direction, if the inclination is all one way, and the fiber of the mental structure is vigorous, the Will is strong. If the incentive is divided, the inclination vacillating, or the mental fiber flabby and inelastic, then the Will is weak. In the form of tension, Will can and doubtless does have existence in the protoplasm of plants, as already said, as well as in the fibril of the muscle, and in the neuron of the brain or spinal cord, even if not in the affinity of chemical elements.

It must be remembered that the volitional force which controls muscles and holds them in contraction, or restrains the contracting impulse by placing an opposing tension in the nerve cells or molecules, arises in individual cells or molecules, and does not arise primarily in whole nerve centers or ganglions, or the whole brain at once. If Will is a separate and independent entity, then there are Wills innumerable in the same individual.

The force known as Will affects the larger units of mental or physical elements, because after having arisen in separate cells, it is gathered and coördinated along with the operative forces of which it is really but an aspect. That is to say it manifests itself simply as stress or intensity of nerve action directed either to the production of muscular contraction or inhibition, or to the control of thought activities.

If it is not a separate entity, but a mere quality or degree of intensity of action or stress of activity, the energy which in man constitutes the volition of which he is conscious,

or its counterpart the determination and regulation of muscular action or tone may well dwell in all living things.

In many animals largely, and to some extent in man, if the spinal cord be severed, irritability and excitability will still persist, and irritation or excitation will elicit movements of the muscles of the extremities which receive their nerve supply from that part of the spinal cord beyond the injury. Vigorous spasms either tonic or clonic may take place in a large proportion of animals, after the head has been severed from the body. A form of Will persists in the dissevered part, for a time in these cases, and one can not well say that it differs from the Will of the whole organism as it existed before the separation, except that now coördination cannot be effected in the same degree, and a perception of the intensity of the muscular action cannot be aroused in consciousness.

FREEDOM OF THE WILL

The contention that the Will is subject to no rule of action, that the accidental whim of the conscious individuality is in any case the controlling power, involves the assertion of a category different from all other processes in nature, since it places the human Will entirely outside the operation of law, and thus makes it the one thing whose action can never be foretold. Here alone, in that case, would we have reached a final self-governing cause. But it is in the highest degree improbable that there can be only this one exception to the reign of law.

Nor do the great majority of those who profess to believe in the freedom of the Will, square their actions and anticipations with their professions. They almost invariably expect the individual to act upon the predominant motive or inclination. This is the involuntary tribute we

all pay to the truth of the principle. For, given a full knowledge of the nature and the character of the man and the act, everyone will venture to predict his line of conduct under given conditions. Whenever one says, "I know what I would do under such and such conditions or circumstances," he denies by implication the freedom of the Will; for the warrant of such a prediction has its basis in nothing else than the fact that volition is exerted in obedience to law.

Whoever devotes himself to a careful analysis of any movement he may make or any act of volition whatever, will probably never fail to discover something going before the effort and deciding or determining what it shall be. If, for example, he is prompted to point with a finger, his first impulse is to use the index finger. This comes primarily from the simple reason that the index finger has a fuller and more suitable muscular equipment than the other fingers and is adapted to a larger range of movement.

If he chooses to point with the second finger, because he "wills" to do so, as he puts it, he will find on careful introspection, the desire to show that he can do it. The inclination to please or to oppose, antagonism or sympathy, has brought about in his mind the decision to make the election. For it is not to be forgotten that both antagonism and sympathy are not only determining forces, but forms of real energy. If one decides to make some movement, merely to be making a movement, and without any apparent or definite aim, or to perform some indifferent act such as pulling out a hair or touching his lips, he makes that movement because it was the first or the most forcefully suggested, or the first to come into conscious memory and the one to which the predominant inclination most readily leads.

In short, if all the complex promptings that control

conduct in which Will may be manifested, and all the attendant conditions and circumstances were as accurately known as the forces affecting falling bodies, a man's conduct would be foretold as accurately and as fully as the flow of water or the motion of a planet.

Men reach the conviction that the Will is primarily predominant and free, by contemplating the complex preliminaries that lead to an act only at that stage at which its performance is imminent. They take little or no account of the many complex steps leading up to the act of seemingly independent volition or exercise of the Will. They then conclude that because the close of the act accords with the felt inclination, it must be the result of an independent exercise of the Will. They catch a glimpse of a stone as it starts rolling down the slope of a mountain, and unmindful of the preliminary conditions and preparations that made such movement possible, and even inevitable, they come to the conclusion that the stone moves of itself.

But going before, there was always a controlling something, an inclination or a predominance of inclination that was the prompter and the master of the Will; if indeed the Will be anything but persistent predominant inclination.

The gist of the real case in the matter of free Will has seldom if ever been better put than in an answer ascribed to an inebriate who, when told that he could give up the habit of drink if he wanted to, replied, "That is all quite true, but unfortunately I can't want to." There must always be a something going before, a something deeper that leads us "to want to" before we can will.

DETERMINISM AND REWARD

Mankind in general have come to regard it as a settled fact that punishment, or at least the fear of punishment is

essential to the conservation of the social order; and many men, perhaps from the promptings of the feeling that revenge is sweet, are reluctant to admit that the human being, like all others, is purely and absolutely an automaton, moved though he may be by an amazing complex of interacting forces. Men are unwilling to be cheated out of their revenge, as they regard it, and rebel at the thought of being compelled to forego the gratification of their resentment.

The unreasoning are unable to see in this asserted reign of law in the conduct of men, anything more than a denial of personal responsibility and accountability, and a license for all manner of unsocial conduct. And there is no doubt that determinism does deny and even positively assert the abrogation of responsibility and accountability in the common acceptance of those terms.

But a reasonable construction of the accepted teachings of the past, all lead to the same end and the same conclusion as determinism. Even those teachings indeed, which are approved and advocated by the most strenuous partisans of free will, and the most arrogant partisans of vindictive punishment, confirm the doctrine of determinism, while "kismet" of the Mohammedan, fatalism of the Greeks, and predestination of an order of Christians are but other names for the same idea.

"Train up a child in the way he should go, and when he is old he will not depart therefrom," is held by most advocates of the principle of free Will to be a precept of divine authority. And it is a teaching as true as it is ancient. But the child is not responsible for his training, and if his organization is so defective that he is incapable of being trained, surely he is not responsible for his organization.

There remains only one other factor entering into the

trinity of influences that shape a man's character and determine his conduct, and that is his environment or the total of the affective circumstances in which he is placed. To say one can choose his own environment is to beg the question at issue, for by that very contention we assume the existence of free Will.

If, then, a man has chosen his environment, insofar as he may so choose, in full accord with his organization and his training, which indeed he will always do, he is not responsible for his character nor in the final analysis, for his conduct. Therefore, in the last, the supreme hour, such a man, though his sins be as scarlet, after he has stripped off and rendered back to his ancestry all that he has come into by inheritance; to his training all that it has imposed, and to the world of his day, to the circumstances and social forces affecting him, all that is due to their influence, he will venture out to "cross the bar" into the untried shoreless waste, with not a threatening cloud to mar the horizon of his hope, and with sails as white as the foaming crests of the billows that divide in his pathway.

Just and fit then is the old Roman maxim, "*De mortuis nil nisi bonum*,"—"Let nothing but good be spoken of the dead." And justly and fitly might the maxim be found inscribed on the monument of every mortal, upon whose eyelids eternal sleep ever pressed its soothing finger.

But is there then to be no punishment for offenses against the well-being of society? Shall every crime go unavenged, and every criminal unwhipt of justice? Not by any manner of means; only that punishment must not be vindictive. Certainly there must be punishment for offenses against the social order, and by all means let it be swift, just and sure, and such as shall secure to society peace and safety. Swift and sure punishment for wrong doing, for sins against the social order, is a part of the envi-

ronment, a factor of the inclination, that it is the duty of of society to hold up before the eyes of every individual in order to help and enable him to do right, and to restrain himself from doing wrong.

Society has little need and little right to worry about the sinner getting his just punishment in another world. The sinner is the product in a broad sense of the society that he burdens. Society itself, or the race, is the real culprit, and the very existence of evil doing and the evil doer, is the just punishment that is visited upon it for having produced him and aided in imposing upon him his behavior.

POSSIBILITY OF RACE BETTERMENT

“But,” it may be asked, “if the Will can never take the initiative, if it is merely a mode of cell action which itself begins in or is instigated from the subconscious, if all volition and all mentation are ultimately and fundamentally automatic, and all feeling equally so, what is there in all the range of possible influences that can lead or move the world to improve? What is there that can make men better?” The answer is that there are in nature two forces at least that work for the betterment of the race. Or rather it might be said that there is a meliorating force manifesting itself in two forms, one operating directly and the other indirectly.

The indirect and secondary form is human experience. Men come in the course of time to realize greater happiness from conduct which is in accord with reason and conscience and that meets with the approval of their organic sense of justice, than from conduct of an opposite character; and this is taught by the old to the young.

The direct and primary cause is the tendency of time and distance to soften asperities of feeling, and is itself due to

the fact that with time and distance, an increased gentleness of movement characterizes the vibrations of which all mental activities consist.

Can anything be imagined that would more effectually drive from the heart of man the spirit of hatred and revenge toward his brother man, than the full and clear conviction of the fact that that brother, in all his course and conduct, was doing the only thing that the motives and the incentives controlling him permitted him to do; that he does the only thing he "can want to do"? Guided by such doctrines and convictions, men could then come truly to hate the sin and love the sinner. And this is the new evangel, the new old bond of brotherhood that in the happy future will bind man to his brother.

For twenty-five centuries, the sublime injunction of Confucius, "This is perfect virtue, to go forth always as to receive some great guest, doing nothing unto others that you would not have them to do unto you"; and for nearly twenty centuries that other sublime injunction imposed by Jesus, "Do unto others as ye would that they should do unto you," have wrought upon the hearts and minds of men, and yet have failed to bring justice and peace and happiness to countless numbers, to the vast majority of the human family. In the doctrine of determinism a new evangel appeals, originating like the others, out of the characteristics of the excursion of the ether wave, out of the very nature of the behavior of the infinite energy.

It tells me that I am not to hate my brother when he seemingly wrongs me, not because I am forbidden to do so, but because he acted in necessary response to the incentives for the time controlling his conduct, and that under the circumstances and conditions, he could act no otherwise. Let this doctrine once come to completely dominate the human race, let men once come to realize it in all its fulness,

and hatred, bigotry and intolerance would melt away from the hearts of men like a mist before the rising sun.

EMPHASIS AND INFLECTION

The laws that determine the character of intonation and inflections of voice, as exemplified in the expression of ideas and emotions, and also the character of physical movement elicited in the like office, will be found also to lend additional and reasonable support to a theory of mental activities based on vibration and vibration groupings.

The same principles prevail in this regard throughout all departments of animal life from the lowest to the most exalted. The child from its first attainment of the power of speech is able to express its feelings and desires by the employment of emphasis and inflection, in a way that insofar as its understanding goes, is not surpassed, if ever again equalled in the highest state of its subsequent mental development. The lower animals, also, to the extent that they are capable of giving vocal expression to their emotions, feelings and desires, employ intonations and inflections very similar to those employed among human beings. Furthermore such of them as are not possessed of voice find expression in physical movements closely related to and suggestive of those which men employ under similar conditions.

Every thoughtful observer knows that neither the child nor the animal is under any necessity of learning either emphasis or inflection or the right mode of physical expression from any teacher. The proper mode of expression is instinctively chosen and intuitively understood. Certainly then we ought to be able to trace out and understand the origin and nature of that which all children, and many

lower animals, come by so easily and uniformly. Yet as far as the writer's knowledge goes not even an attempt has heretofore been made to develop the philosophy of this, the most important, as it is the most nearly universal class of accessory elements employed in expression, and one of the most indispensable aids in the effectual communication of thought.

BASIS OF EMPHASIS

Let us first endeavor to ascertain the basis or the reason for emphasis and the various forms of inflection. From the standpoint of evolution, the basis of emphasis as well as evolution is evidently to be found in its economy. No possible number of words could convey all the meanings communicable by the various modifications of which the voice is capable, and the more especially when helped out by the expressive physical movements which are themselves the correlates of vocal expression and even of thought. The power and ability to make them available gives the possessor a corresponding advantage in the struggle for existence.

But these modifications of vocal and physical expression must be present, potentially at least, before the test of fitness can be applied; and it is the ulterior cause and reason for their existence that we have yet to ascertain. The primary factor and cause, that is, the one nearest to the first cause that we can conceive or grasp, is curiosity or the natural craving of the mind for knowledge. This is not in any likelihood the ultimate agency, but whatever goes before it is probably as much beyond us as the cause of affinity among chemical elements. The next step beyond curiosity or innate desire for knowledge, or the "Will to know," as the Germans term it, is probably the

inherent satisfaction or pleasure to be derived from the contemplation of objects singly.

The attention of both men and animals is gratified when permitted to be occupied by a single object or a single clear cut idea at a time; and the more attractive an idea or object is, the greater is the gratification in having it as the exclusive occupant of the attention.

If an object is presented to us separated and placed out by itself, it is an easy task to fix the attention upon it, but so long as it forms an inconspicuous member of a mass or group, this is more difficult. In contemplating a landscape or a crowd of men, for instance, we may find a vague or even a lively pleasure; but this pleasure becomes livelier still when we are enabled to contemplate the members of the group individually. At all events the tendency of the mind, the drift of the thoughts, is ever in the direction of the contemplation of objects separately, or of the contemplation of conspicuous concrete groups that answer to separate objects.

We may perceive this disposition of the mind manifested on a large scale in history; and in it to a great degree is to be found the source of hero worship. It is much easier to select the one person who may happen to be most conspicuous in a given field or period, and ascribe to him all the merit due for some great attainment to which a whole people have contributed, than rightly to distribute, and award his just share to each of many participants. For, "To him that hath shall be given, and from him that hath not shall be taken away, even that he hath," is a maxim grounded in the laws of attention.

In addition to what is commonly known as emphasis is to be considered that further form of stress of voice known as inflection, which is in reality a prolongation, sliding or stretching out of emphasis, or rather a combination of

emphasis and intonation which gives a meaning to speech, impossible to mere words. Furthermore these inflections are uniform and common to all races of men, and to all lower animals insofar as they have the power of vocal expression. And they are in almost all cases, the correlates of the physical movements by means of which animals possessed of voice, supplement vocal expression, and by means of which animals without voice, give expression to feelings and desires.

Thus a demand or an unfinished action would be expressed by one deaf and dumb, or by an animal, by an attitude, or a movement of aggression or confident expectancy, such as holding up the head or leaning forward stiffly. A concession or yielding, on the other hand, would be indicated by an attitude of relaxation or shrinking back into repose. So when a demand is made vocally, or a question asked that requires a direct answer, the rising inflection is used, because this typifies aggression. On the other hand, when an answer is given which is intended as a satisfaction of a question, or when a request is granted, it is felt to be an end of the effort, and the falling inflection is employed. The dying wails of conquered animals is everywhere uttered with the falling inflection. A mare separated from her colt will nicker with the rising inflection, which is equivalent to a demand to know where her colt is, or a demand for its return; and the colt will act in the same way in regard to the mother under like circumstances. But when they have found each other, both will whinney with the falling inflection. Indeed, the rule holds good throughout the animal kingdom.

And there is little room to doubt that the expressive physical movements resorted to by animals are inter-translatable throughout, with the corresponding vocal expression and are intimately connected with the elements

of the ideas they are intended to convey. The fundamental vibrations and vibration groupings that constitute the thoughts, and those that lead to expressive physical manifestations as well as the physical manifestations themselves are in the last analysis probably the same in all these and like instances.

But what is the prime motive force? What is it that initiates emphasis and inflection? Is it the prompting of the importance and value that we attach to the ideas to be expressed that leads to the employment of stress, or is stress chosen with the desire to impress others? The fact that young children and animals give stress with as great if not greater freedom and accuracy than human adults, is conclusive that the use of emphasis is intuitive with the speaker and actor; a part of the primary instincts.

It is probably an invariable rule that emphasis involves and conveys a burden of meaning outside of the spoken words that carry it. A single phrase and often a single word can be made by implication to convey a wealth of meaning through appropriate vocal inflections. What magnitude of paraphrase, for example, would be required to convey all the meaning impressed by the words, "The sea, The sea," shouted by the Greeks under Xenophon, when the sight of the Euxine assured them that the most impressive retreat on the pages of history had come to a happy ending.

This principle has its foundation laid deep in the laws of physics, and is intimately connected with that which leads to an instinctive demand for the proper balancing of sentences in writing and speaking. Every truly complete and satisfactory sentence must have this quality of balance into however many parts it may be divided. In its final analysis the principle seems to be grounded in the law of the equality of action and reaction. As far as the wave rises

above the level of the sea, so far its trough must sink below. The excursion of the pendulum on one side must be counterbalanced by an equal excursion on the other. Oscillation is a form of compensation, and it is one of the laws of energy.

So when vibrations and vibration groupings are bunched or concentrated on a short member of a sentence, the intensity of the action may be offset either by a like intensity of stress on the other member, or the length of the opposite member may be strung out with slight or mild stress so as to equalize the forces of action and reaction, thus effecting a balance or equilibrium. Especially is this feature noticeable in the employment of the circumflex inflection. Here the principle finds an apt illustration in the balancing of two weights on a scale beam. If one arm of such a beam is short and the other long, a proportionally greater weight on the short arm is required to balance a given weight on the long arm.

So one idea or fact employed in the way of antithesis or contrast, if of great moment or intensity and represented by extensive groupings of vibrations, suffices to counterbalance a large number of facts or ideas represented by diffuse vibrations which are expressive of milder impulses.

Nor is it altogether necessary for the words or phrases on the long arm to be expressed in order to convey the intended meaning and produce the intended effect. A single word may be pronounced with such force and quality of inflection as to suggest the nature and character of the ideas embraced in the counterbalancing clause or clauses. It is sufficient if all the factors are present in the mind of the speaker.

How much of all the relations existing between Caesar and Brutus, the history of early antagonism and hostility, of pardon, of reconciliation, of strong friendship, then of

conspiracy, betrayal and assassination must have been suggested and conveyed by Ceasar's dying exclamation, "Et tu, Brute," uttered as it doubtless was with all the force of the falling circumflex as the lion of so many bloody fields sank down at the foot of Pompey's pillar.

INSTINCT AND REASON

The vibratory theory of vital manifestations contributes to an explanation of the origin of instinct and of the reasoning faculty, insofar as the latter term signifies the adaptation of means to ends, that differs somewhat from the explanations offered by current theories, or any other explanations that have hitherto been offered as far as is known to the author.

Evolution would place the original source or germ of both instinct and reason alike in the primal star dust. That is to say that both instinct and reason are implicit in the corpuscles and the associated energy out of which the beings that possess instinct and reason are developed. The primal vital corpuscles tend to give off the interacting vibrations and vibration groupings that are reason and that are instinct.

The contention already advanced regarding the necessity of a practically unlimited store of the life principle, possessed of a tendency to pass or be transformed into vital forms as a prerequisite to the continuation of life on the earth, applies to instinct and reason as well. For if instinct and reason depend upon vibration, they are necessarily the results of modes or forms of the manifestation of energy, and must be renewed as they are exhausted. Among the chemical elements it is impossible for new combinations to be continuously formed, except in the presence of and in connection with a constantly renewed supply of

appropriate material with unsatisfied chemical affinities. Nor can work anywhere be accomplished without a corresponding degradation of energy.

Therefore even though life had come many times to the earth from some other planet, unless the elements out of which living beings were to be formed, that is, unless there had abounded on the earth corpuscles and forces apt and ready to enter into the constitution of living forms, the perpetuation of life from such a germ would have been absolutely impossible; just as much so as the perpetuation of a conflagration among ashes, or the support of a flame wholly with carbonic acid or water. Indeed though the earth had by some miracle been peopled to its utmost capacity, in the absence of a provision of vital energy outside of the living beings at any time in existence, not even a second generation would have been possible.

In a mass of blocks however extensive, if all are in a state of unstable equilibrium, if all are leaning sufficiently in the same direction, the removal of a single one might cause the entire collection to tumble. But if all were in a state of stable equilibrium, and without the energy of position, that is, if every one was resting on its own base, the removal or falling of one would not affect the others.

If, then, it is true that force or energy must always have its abode in or with ponderable elements, elements which left to themselves would proceed to collect together under the influence of gravitation, and such elements only; we are driven to the conclusion that the arrangement of essential vital corpuscles, whatever they may be, together with the forms of force-groups or vibration groups which accompany them, produces or gives rise to instinct and reason, as it does to the organs in which instinct and reason reside, or through which they operate.

The simplest example of what we may call instinct is

to be observed in plants. If a collection of compost be buried in the soil in the neighborhood of a growing tree, but several yards beyond the extremity of its most advance rootlets, the roots on that side will take on renewed growth, and reaching out will invade and appropriate this store of nutrient material; the roots which grow in other directions meantime remaining unaffected.

When Indian corn is tasseling and silking, the strands of the silk which are female organs, on emerging from the shuck, will bend upward in order to receive more readily the pollen or male element as it falls from the tassel, the male organ. The case of the wild-pea vine and the suckers has already been referred to in another connection, and thousands of similar examples might be collected and adduced.

Now in the case of the tree roots and the nutritious compost, it is not to be supposed for a moment that inherited experience enabled the roots to go in search of the hidden pabulum; and as certainly it was not a reflex of a sensori-motor character or of any character in the ordinary acceptation of that term; and quite as certainly it was not an example of lapsed intelligence. How then can it be explained? What can be its origin?

The author does not believe that these phenomena can be explained without invoking forms or modes of behavior of vibrations of a character different from any hitherto taken cognizance of by science. There is little room to doubt that a special form of vibration akin to nerve force is all the time playing throughout the tissues of plants and trees, and connecting their tiniest rootlets with the remotest buds and leaflets. This force is probably in the main of a trophic nature, and by the interaction of its currents, it determines the shape and symmetry of the tree, as well as its structure and composition, by presiding over its development and growth.

The motions of this force are most likely akin to those involved in the production of flower and lace effects in frost forms, in the patterns of the treasures of the snow, the figures of dust gathering on vibrating goldbeater's skin, and other like manifestations in inorganic life already referred to, only the organic are vastly more complex.

These quasi-nervous vibrations, it would seem, are not restricted to the body of the tree, but take on also the form of emanations. In the case of the compost and the tree, these projected emanations, according to the resistance they experience, or the welcome they receive in the way of harmonious response, it would seem probable, determine a reaction which controls the extent and direction of the growth of the roots and rootlets as well as the method of the appropriation of the nutriment they obtain.

The chick, as soon as the shell has fallen from its back, pecks its food with an accuracy that is almost unerring. Now the ancestors of this chick never probably in all their generations learned or had to learn this act any more than itself has done so; never thought it out or contrived it. The vibratory forces inherent in the structure of the chick imposed the act upon it by their orderly movements. They gauged the muscular sense, guided the muscular movements, measured the distance, calculated the direction, and even probably distinguished the food.

The tree is rooted in the ground with its leaves in the air. The chick is free to move about, for its roots are in its alimentary canal and its leaves in its lungs. but between the tree and the chick, in the particulars named, there is no essential difference. For the rootlets of the tree there is prepared a separate solvent fluid for each element of the soil it needs to absorb; and in the stomach of the chick, as in the stomach of all other animals, a different kind of digestive fluid is secreted for each different kind of food ingested.

But what then of reason? We are prone to speak of reason in its relation to instinct as if reason were the broad controlling entity, and instinct a trifling subsidiary activity that could not exist without reason; some shed skin of reason as it were, thrown off in the dim ages of the past. Wherever there is found apparent design or contrivance, we incline to begin to inquire whether conscious reasoning may not sometime or somehow have crept in as its cause.

Now reason in the sense of consciously designing or contriving is the mere blossom, the mere foliage of instinct and one is just as automatic as the other in its original inception. A mushroom bed when seeded, in a little while becomes all shot through with silken threads of mycelium. A little later this mycelium or mold sends stalks of mushrooms up through the surface; and then forgetting all the wealth of growth that lies beneath the surface, we attach importance only to the showy growth of a night that appears above.

So it is with instinct and reason. In considering the seemingly spontaneous development of the tree, we forget the formation of root and branch and leaf and flower, forget the thousands of wonderful combinations built up in its juices; forget in the animal the stringing of the numberless electric wires of the nerves, the tunneling of the arteries, the transforming of the epidermis into tooth and tusk and hair and horn, forget the whole fearful and wonderful construction of the body and the faculties with which it is endowed, all of which are essentially automatic, spontaneous or instinctive, and then discovering a sporadic outcropping called reason, we begin wondering how instinct can so much resemble it; wondering how the tree came to resemble in so many features one of its little branches.

The power of conscious reasoning is but an ornament on the brow of instinct, the out-cropping of an exhaustless

ledge of hidden wealth while instinct is little else than unconscious or subconscious reasoning. Instinct is but the reasoning, the formulated organic logic of nature.

Let us endeavor to construct a definite conception of a method by which instinct might originate, on the basis of the principles here indicated. And it may be said that in doing this we are but describing the methods by which tendencies in the elements of all organic bodies mold these elements into definite forms and develop appropriate functions.

As an example, for the purpose of illustration, we may take a cue from a practice common among chemists. In conducting chemical analyses, it frequently happens that when a solution of several substances mixed together has reached the point of condensation at which crystals are about to form, the precipitation of crystals of any crystallizable substance it may contain, is greatly promoted by adding to the mixture pure crystals of that substance. This process is called by chemists, "seeding out."

With the purpose referred to in view, ready formed crystals of niter are often added to hasten the precipitation of crystals from the mother liquor in the manufacture of that article and these crystals are called "mother crystals." Old sugar is often thrown into the kettle to promote the crystallization of fresh sugar from dense maple syrups. But one of the most striking examples of the operation of the principle is found in the behavior of carbonate of lime when dissolved in sea water.

The water of the ocean holds in solution uniformly twelve hundredths of one per cent of carbonate of lime. Now if a quantity of sea water be put into a bottle, it may be kept for any number of years without the slightest trace of precipitation. But if into the bottled water a few crystals of carbonate of lime be dropped, precipitation will

be set up and will proceed rapidly until the quantity in solution in the water will be reduced to nine-hundredths of one per cent; three-hundredths of the carbonate having been, "seeded out."

We will suppose now that the ions, electrons, corpuscles, or what not, that constitute the basic elements in which the vital forces are inherent, possess the tendencies that lead them into the construction of, or arrangement into, the physical forms from which spring any and every one of the known kind of living beings and everyone of the known characteristics of vital function. We must assume also, as before indicated, that these tendencies embrace every known organic form and every form of vital manifestation, and that no forms can possibly occur that are not the product of these elements.

In the tree, for example, when these vital corpuscles are being "seeded out" so to speak; when one lamp is being lighted by another, to use the expressive language of the East, the tendencies of such corpuscles cause them, or the coarse atoms and molecules they control or direct, to assume the form of a tree. By virtue of these same tendencies this tree begins searching for food, and developing all the features that go to constitute a tree as well as evolving all its products. In the chick, on the other hand, the tendencies of the forces bound up in the corresponding corpuscles, automatically point out its favorite food, the method of obtaining it, and also instigate the desire for it as well as the inclination for the perpetuation of its kind. In short the tree and the chick, like all other living things, are in the last analysis absolute automatons.

If it happen that the corpuscles thus "seeded out" from the vast alembic of nature are sufficiently erratic in character, sufficiently off of the direct line to materially disturb the old order without effectually inaugurating a

new one; sufficiently erratic to produce a freak without establishing a species, the individual in which this happens will prove to be unfit and will be eliminated by natural selection.

The revelations of Mendelism seem to point to the conclusion that these essential vital corpuscles are not greatly modified while being incorporated together into new individuals. This is indicated by the fact that races mingled and bred together for ages, never completely mix or unite in blood. The different elements of the combination are liable under such circumstances to crop out through startlingly long periods of time. Indeed there are instances in both animal and plant life in which reversions occur to supposed ancestral forms, or to features of ancestral forms that had apparently been discarded by the particular species for millions of years.

This would not be so hard to realize, if we could bring ourselves to believe that these stubborn reversions were merely the occasional incorporation from nature's vast storehouse, of certain essential vital corpuscles of the kind wont to be used by ancestral organisms in the remote ages of the past; in short, that in the particular instance the "seeding out" had been imperfectly effected.

Various authors have adduced instances of seeming reversion which was indicated by the appearance in man of certain lower animal traits, as evidence of his descent from lower animal forms.

Among the traits adduced have been instances of close resemblance in appearance and behavior of certain degenerates, to those of a goose or sheep or some other animal, while Darwin himself adduces the sporadic power in the human being, of the voluntary regurgitation of food, or partial rumination, as evidence of such descent. It is perfectly obvious, however, that neither goose, sheep

nor cow could by any possibility have ever been in the line of man's descent.

But if we could suppose that in the individual case, the germ group of vital corpuscles was so laxly combined or organized as that it let in from the common life-reservoir, which is possibly coextensive with the universe, one or more vital corpuscles which, with their tendencies belonged to such lower forms, or was properly adapted for use in such lower forms, we should have an explanation more consonant with reason even if somewhat fantastic.

And if it could be shown to be true that vital corpuscles are primarily endowed with the energy and tendencies that carry them through the production of all the various transformations or metamorphoses manifested by living organisms, we should have supplied us an explanation of all the many complex changes in the development of insect life, that have hitherto proved inexplicable.

In that case we should only have to suppose that the primary germ-group or vital molecule, consists of vital corpuscles possessed of vibratory powers which in something like the fashion of the boomerang, carry the insect or other organism through all the varied transformations or metamorphoses observed in the life history of each individual. Like a lightning change artist or a developing skyrocket, when sent aloft, the germinal group of corpuscles contains within itself, as an original and perpetual endowment, the energy or at least the tendencies, that carry the resulting individual through all the transformations experienced throughout its life history.

A whole race of young birds that have never seen or known any land other than that in which they were bred, will gather year by year from far and wide, in response to some mysterious signal, and by trackless routes over continent and ocean migrate to unknown regions, perhaps

half the circuit of the earth away; while the fishes constituting the entire habitancy of a lakelet, will upon the approaching disappearance of the water by reason of drouth, bury themselves both great and small, in the mud of the bottom, though this may be their first experience of such a drouth in many generations.

How did the fishes learn to bury themselves in the mud on the approach of the first drying-up in all their experience? And how did the birds learn the lesson of migration along paths and through regions to them absolutely unknown? Or if the parents learned the lesson, how did they teach it to their offspring and how did they transmit it to their posterity? As well ask how the boomerang learned to return to the hand that threw it, or how the skyrocket learned, when sent aloft, to pirouette in the air.

The performance of the birds and fishes is a response to a larger complex of forces than that of the skyrocket and the boomerang, and is seemingly less pre-arranged, but both are equally responsive and equally automatic. From nature's limitless store, were "seeded out" the essential vital corpuscles that would be required to build up a bird or a fish, responsive to mysterious notes of warning unrealizable by man, impelling it to bury itself or to migrate, though this should prove to be the first experience of such need in all the history of the race. And if there happened to occur in any line, a departure from the appropriate type, that is, if there happened to be an error in the "seed-ing out," natural selection would effect its elimination when conditions required.

In man all the physical forms of the various tissues and organs, and many of the functions, are developed by such tendencies of the basic vital elements, in a manner as automatic as that observed in the tree. And later other faculties or functions, such as thought, will, desire and the

like, are developed in the same sponanteous or automatic way in the subconscious, after this has been informed through the medium of the conscious.

In some such way must have been produced all the wonderful examples of mathematical, musical and inventive genius, as indeed of all forms of genius of whatever character, that have stood forth among the marvels of human history. In this way too their inspiration has been manifested and made effective. Indeed it is hardly to be doubted that in the dullest human being, there slumbers the possibility of a Blind Tom, a Colburn, an Edison, and even a Newton, or a Shakespeare. The result, in all likelihood, depends upon the character or nature of the intimate structure of the organic basis, and this may sometimes be measurably supplied by an accidental modification of the tissues of the brain or some other adventitious influence.

In the oft repeated story of the servant girl who upon the coming on of a fever, was enabled to repeat passages of the Talmud which she had casually heard read at her window, though at the moment of hearing and until the coming on of the fever she could not have repeated a single word of them; something like this must have taken place. Some character or some order of obstruction must have been removed by the fever, which in health had prevented the reproduction of the impressions that had been made subconsciously in the neurons at the time of hearing the reading.

A like power of revealing the indwelling intelligence of the universal energy in association with organic elements, pervades not only the human race, but also every form of life in a greater or less degree.

THE TRUE, THE BEAUTIFUL AND THE GOOD

Age-long discussion has prevailed among philosophers as to the source, nature and basis of what has been termed, "the true, the beautiful and the good." And probably at no time in the past have the partisans of opposing views been farther apart than at present.

A large part of this diversity of view is doubtless due to a want of understanding and agreement, as to the exact scope and meaning of the terms involved in the discussion.

It would be exceedingly difficult to settle upon a definition, in a wide sense, of any one of these terms that would meet with the approval of even a majority of those who give the matter attention.

Notions of the "true" probably present less diversity than either of the other divisions. Indeed it is not easy to escape the inference that beauty or the beautiful and the good on final analysis are merged in the true. Perhaps the most appropriate definition of the true is one drawn from the root signification of the term, namely, that which stands the test of trial.

Primarily that is beautiful for each individual which on account of its form, structure and coloring is pleasing to look upon. In the secondary sense, things in the abstract are regarded as beautiful when they produce a similar or kindred influence on the mind.

The term "good" as used in this connection has purely an ethical meaning, and comprehends the spirit and bearing with which we seek the welfare and happiness of others, while ourselves obeying the teachings approved by the consciences of men in general, as being just and right. The main question to be considered here is the basic nature of the terms and concepts under review.

Is there an ultimate, unvarying and universal standard by which truth, beauty and goodness are to be tested and judged? The answer is not far to seek. If there exists an absolute standard, it is not yet within the grasp of human understanding. It would be exceeding difficult to settle upon a definition of any one of these terms that would meet with general approval.

The terms "Good and beautiful" seem to be largely if not entirely relative. The same act which is regarded as beneficent on the part of one person or of one class and held to be good, would be regarded as bad on the part of another. Everywhere the motive of the act seems to determine its character as good or the contrary, and so widely divergent are the judgments placed on conduct that the pragmatists are not easily withstood when they insist that the good or bad character of things depend upon their workableness.

Goodness may be regarded as purely a relative matter except in its aspect of kindliness. In this regard there may come into play the softening effect of the undulations that constitute the dynamic source and basis of all our feelings.

And what of beauty or the sense of the beautiful? Is there a universal and changeless standard or rule which we can everywhere apply, and by which we can test what is beautiful and what is not? Some sort of rule there must be, even though that rule be a succession of accidents; for how can we say that anything is beautiful or that it is not unless we can compare it with other things that are recognized as beautiful, or contrast it with still others that are not so considered?

But if it be true that the notion of beauty is based upon the correspondence or harmony between certain external things and the concepts of such things, as these concepts

tend to be formed in our minds in response to or under the influence of a certain character or certain classes of the vibrations that uniformly constitute the manifestation or expression of energy, we are supplied with a guiding principle for a judgment of the beautiful that is unchanging and well-nigh universal. It is here that thought and thing are rocked in the same cradle.

It was a contention of Darwin that beauty of song and plumage among birds has been developed by the selection on the part of the females, of such males as are best endowed in these respects; the less beautiful males, wherever there was a surplus, being left unmated. Beauty in flowers, it was similarly contended, is produced or developed by insects making a practice of selecting the gaudiest or most beautiful flowers when searching for nectar. The result of this was claimed to be that such flowers were better and more certainly pollinized than homelier and less conspicuous ones.

But careful thought cannot fail to impress us with the improbability of the view that the production of beauty in birds, flowers or any other thing can be effected in this way. There must be something else operative in these cases besides blind chance or accident. Beauty in such a contest could never win, could never make any headway, unless the chances were in its favor,—unless the dice were loaded.

The tastes and the expressed choice of the females in the example of birds, could never determine the evolution or the development of beauty in the males, unless the females were already endowed with a permanent standard of taste for the measurement or test of beauty, and by which they were controlled in its selection. The doctrine of chance absolutely prohibits it. In the absence of such a standard as we have here supposed, by which the females could be

guided in their choice, each generation must on the average undo what had been accomplished by the females of the generation before.

The same rule would apply to plants as affected by insects. While it is true that mere gaudiness or conspicuousness might be determined in their development by insect selection, beauty simply as such never could be. Here too the dice must be loaded, and the appeal of conspicuousness in the case of the gaudy flowers is the lead that loads the dice and measureably eliminates chance.

No fixed or steady direction can ever be pursued by chance. If a man should set out on a journey regulating the direction of his steps by tossing coins, taking a step forward when "heads" came, and a step backward when "tails" came, the period of a hundred or a million years might come to a close and find him practically where he had started. The complex beauty, therefore, that addresses itself to human judgment or fancy as such, must have a different and deeper cause than such unguided selection.

It may be objected, however, that if such reciprocal correspondence, such harmony must exist between mind and external things, if such is the all-pervading law of beauty, why is it that the beautiful to one is not the beautiful to all? Why is it that there are so many and such diverse standards of beauty? The answer is that mental processes are no more restricted to one exact line of development than objects in nature are restricted to one exact pattern; there is always a certain range of possible variation.

Thus frost flowers and mosaic, though depending for their existence on the simple crystallizing force of congealing water, take on a multiplicity of forms. Lissajou's figures produced by the vibrations of a deflected pendulum; dust patterns made by musical vibrations acting on sheets

of tense membrane, and figures formed by iron filings in fields of magnetic force, beside innumerable similar figures, all depending, so far as we know, on vibratory forces as homogeneous as the elements of thought or thought vibrations in the brain, assume forms that vary within wide limits.

The same succession of musical sounds is not agreeable to all minds alike, yet few will doubt that harmony of both vocal and instrumental music with the mental vibrations which they arouse, and into which they may be translated is the basis of the appreciation of music. Nor will any one contend that because different peoples have different notions and standards of music that therefore there is no basic truth or law of music.

And aside from the heterogeneousness of the operative forces employed in the production of thought or physical form, whether found in animate or inanimate nature, such forces must deal with more or less refractory material elements, elements that are not perfectly responsive, and the products or results of which must consequently take on different forms. A certain degree of heterogeneity in vital processes, or the forces underlying them, seems indispensable to their continuance. It is possible that there may be such a thing in nature as too much harmony.

It is permissible then to infer that a vital force, or the undifferentiated force as it exists in the vast reservoir of nature may within certain not very extensive limits develop different forms of beauty in living beings, as the like force develops differing rules of appreciation among discriminating intelligences.

Misleading features and confusion are sometimes introduced into the problem as the result of association; things that are not at all attractive to us of themselves, being

often rendered so by the attractiveness of elements borrowed from other things that are of themselves agreeable.

To this power of appropriating elements from pleasant experiences, ideas and emotions, and thus obscuring unpleasant features of such things, may in a measure be attributed the vogue of what is called pragmatism. This is simply the process of rendering things agreeable or commendable and pleasant, that are otherwise not so, by borrowing or appropriating elements from other ideas or other things that are primarily agreeable, or that meet with the mind's approval. This view finds everywhere support in the common experience of the race, and even probably in that of the lower animals.

A sour mixture may be rendered sweet with sugar, but the acid is still in the mixture and undestroyed. It has simply been obscured and lost sight of by reason of the presence of the stronger sweet. Pain which is ordinarily of the most dreaded kind may be transformed into a positive pleasure by the incorporation into its idea of elements borrowed from agreeable experiences. Thus the zeal of a martyr or the haughty pride of a tortured savage, may cause the flames that are consuming his flesh to impress his senses with a thrill of delight. But it is not that the pain has here actually become pleasure, it is only that the pleasant elements borrowed from cherished hopes, or the satisfying complaisance of withering hatred, incorporated into experience, have obscured and overwhelmed the primarily painful elements.

So by the long continued practice of such borrowing, the native appreciation of whatever is primarily the true, the beautiful or the good, may be grafted on its opposite so as to make this appear to the subject to be the true, the beautiful or the good. But the ultimate basis, the final standard is the correspondence of the internal with the

external order, both founded on the energy vibrations and vibration groupings that are everywhere the unchanging operative agencies.

"Pretty is as pretty does," means simply that ungainly features of mind or person may become agreeable or attractive by being associated with agreeable conduct. The harshest sounds may become as sweet as any music, when they announce the approach of relief to a sorely-tried beleaguered garrison, rescue to the captive at the threshold of torture, or when in fancy they may transport the homesick wanderer back to the endeared associations of the home of his childhood and the circle of its loved ones.

In this light still other seeming contradictions in the phenomena of taste and habit will disappear. Thus one race of people will wear white for mourning and another black, and whichever color, it may be, it will suggest unpleasant experiences and give rise to sadness or sorrow. Not that either color is in its nature primarily productive of sadness, but that whichever color is worn, borrows a suggestion of sadness from being associated with feelings of sadness caused by past partings from loved ones.

Especially may the effects of such imposed vibrations be observed in the training of children, since in them the neurons are exceptionally plastic and impressionable. How else are we to account for the fact that so large a majority of men stubbornly and blindly cling to the social and political views of their parents; and above all how has blind superstition, in the glare of the flooding light of science and reason, been enabled to keep the darksome shadow of her wings spread over the minds of so vast a majority of the human race? If for a single generation, the minds of men could be left wholly free to the influence of truth, the result would be nothing less than a new heaven and a new earth.

THE SOURCE OF MORAL LAW

As a corollary to the principles set forth when treating of the law of beauty, it follows that all recognition of truth, or the true standard of the fitness of things, is a result of the effort of the mind to harmonize impressions received by it from without with the rules framed for its guidance by the orderly groupings of ether waves manifested in the transmission of radiant energy.

Out of the various combinations of the rich store of accumulated vibrations coming to us originally from the realms of space, either directly or indirectly, in the form of light, heat or actinism or possibly in still other forms of force movement, shapes of beauty spring into being under the painter's brush, grand symphonies awake at the musician's touch, immortal rounds of verse take form in the poet's fancy, while they who under its kindly guidance seek out the old, the eternal paths of justice and virtue and love, shall listen to sweet whisperings of rest and peace.

This all-pervading principle, this far-reaching harmony, this lofty music is the standard of truth and beauty and goodness for the universe; the rule of the infinite. And if other worlds are peopled by intelligent sentient beings, their feelings, tastes and moral laws as well must be essentially the same as our own. As far as we can know this harmony and symmetry appear as the absolute, the final standard of truth and beauty.

It is but reasonable to infer from the foregoing premises that the characteristics of feelings, ideas, emotions and the like, as being pleasant or otherwise, depend upon and are determined by the character and mode of combination of the vibrations that compose them and bring them into consciousness. The gentler and more harmonious com-

binations are supposed to constitute the pleasant, while the harsh and discordant or inharmoniously grouped vibrations constitute the unpleasant experiences.

It is the history of the common experience of mankind that pain ceases to be pain, in memory, as the undulations that are the cause and the record of it in the brain become slower, more gentle and more completely harmonized with the lapse of time. And if at any time we are aroused to harsh feelings toward our fellow beings, feelings of anger, resentment or hate, our experience teaches us that there will yet come a time when the harsh wave groups in the brain will soften, and memory will find them more in harmony with the conduct which we were led to condemn than at the time the fancied wrongs were fresh. In the course of life's experience, we reach a stage where we are led, all unconsciously, it may be, to anticipate the more benevolent outcome, and we then incline and seek to pursue the course that past experience teaches us will with the lapse of years, be favored with the approval of our conscience. We relent and we forgive.

All the harsher ideas, feelings and emotions, representing as they do, violent, tumultuous and discordant disturbances of consciousness must in the very nature of things, if left to themselves, take on a more congenial character. Therefore feelings of hate, as the vibrations that give rise to them lose their harshness and their character of disorder, are changed into kindness and forgiveness; just as the tumult of the earthquake reaches far away listeners almost as music.

It is the common lesson of history that the party of mercy is ever the one that in the end receives the world's approval. "Blessed are the merciful for they shall obtain mercy," is a precept widely accepted as divine; and one who read the book of nature with the eye of a seer has told us:—

“The quality of mercy is not strained,
It droppeth like the gentle rain from heaven,”

A famous poet has charmingly written:—

“Know ye the land where the cypress and myrtle
Are emblems of deeds that are done in their clime;
Where the rage of the vulture, the love of the
turtle,
Now melt into sorrow, now madden to crime?”

There is many a land where “The rage of the vulture, now melts into sorrow,” but the flooding searchlights of all the twinkling stars reveal no retreat where “The love of the turtle now maddens to crime.”

Indeed if hate were not fed with food of perennial wrong, it would fade from the hearts of the children of men. In its very nature it is transitory and evanescent. And to contend, whether through motives of cowardly fear, blind ignorance, or sinister design, that there exists or could exist a being of infinite power and wisdom and justice and mercy, who yet can indulge a feeling of eternal hate, is to contend that a being of infinite wisdom, power, justice, and mercy eternally violates laws whose author he must be in order to be at all.

CONSCIENCE

Conscience is the response of the soul or the intelligent ego in man and animals, to the orderly vibration groups affecting it, and which impress it with regard to the laws of conduct related to its own duty, and to the rights, privileges and happiness of those to whose appeal it must hearken. Nor indeed can plants be truthfully regarded as wholly wanting in an inchoate conscience.

We have remarked how the wild-pea vine while trying to climb the smooth stone wall with the help of its tendrils, when finding nothing that its tendrils could grasp, changed them into suckers, and with their aid proceeded to discharge its duty of exposing its flower buds to the sun. Can anyone hesitate to believe that in the meantime, within the protoplasmic mass of its cells which are the seat of its life, there developed an erethism, a stress of conscience according to the plant standard of such things, that prompted it and pointed out to it its duty, and that was relieved when the vine had obeyed its impulse, and the sucker had been substituted for the tendril?

Lower animals of many kinds, after having inflicted injuries or insult upon one another or upon man, have frequently been known to manifest every evidence of a sentiment of regret. The behavior of gregarious animals toward each other, as indeed the whole comity of animal life, in the relation of each to its kind throughout nature, is based upon the operation of a principle that is essentially conscience.

Animals are necessarily prompted by some monitor indicating to them the spirit they are to manifest toward their fellows, and that same monitor either approves or disapproves to them their behavior. But in man conscience seems to have its widest range, for it is that which in normal life approves to the individual his every approach to the all pervading harmonies and symmetries of right conduct and feeling, and condemns every departure or recession therefrom.

The true musician hangs with rapt delight upon the harmony, the melody, the truth of his music. To him discord is pain, and when due to his own failure or shortcoming, it becomes in his sight a species of sin. On the other hand, a vivid pleasure is experienced when the right

notes are struck, when the proper chords are touched and the true melodies and harmonies achieved.

The feeling of self-reproach that punishes the musician for the false note, the scholar for the misspelt word or the slip in grammar, the courtier for the awkward bow, or the prowler of the night for his theft, are essentially the same throughout. The experience of all alike results from a conscious departure from the true standard in these several departments.

When the beautiful language of Greece was in the making, and skill in archery was regarded as of far greater moment than a judicious discernment of the rights of property and person, the most painful sense of faulty conduct known to the man of the period was experienced when his arrow fell wide of the mark. On such occasions "Amartaneka," ("I have missed the mark") was the archer's expression for the saddest general experience and the largest cause of self abasement, known to the man of his era. So when later a fuller and a higher sense of duty developed, and men began to feel the need of words in which to make confession, when they realized that they had culpably failed in the performance of social obligations and had violated their own convictions and society's requirements of right doing, still mindful of their experience with the bow and the arrow, they found no word more expressive of their state of feeling than "Amartaneka" ("I have missed the mark. I have sinned,") now giving the term its figurative or secondary meaning.

And so it ever is with that higher harmony, that loftier music whose responsive strings are touched by the fingers of the ether waves, and to whose measure the soul in search of happiness and peace must keep time submissively. The far-reaching and never-ceasing influence of sense-impressing ether waves upon the soul or life principle, in

the final outcome, makes always and everywhere for kindness, for peace, for order, for justice and right, and furthermore tends ceaselessly to inculcate and to impress the enforcement of these principles as an imperative duty and a sure way to a pleasant reward. In this initial fountain and source the true, the beautiful and the good meet and merge into one.

And any seeming departure from the rule so imposed, appears only on the by-paths of selfish interests that grow out of the promptings of the exaggerated necessities of individual and race protection and perpetuation. Sin and wrong and violence and hate are but the little eddies and countercurrents of selfish interests encountered in the vast riverflow of peace and harmony and love that is forever sweeping through the universe. And forever present and ministering is the monitor; for conscience is an ether lesson, taught, since eternity first gave birth to time, in more or less completeness, to every living thing.

RELIGION

We have finally reached a stage in our investigation where we may attempt with some degree of confidence to enquire into the essential nature of religion, or the religious feeling and to ascertain whether we may not also trace it to the gentler undulations of the ether.

In pursuing this inquiry it is desirable and important, at the outset, clearly and sharply to distinguish between religion and so-called theology. For while as a rule the particular views one may happen to hold in regard to the character of the divinity he worships, will necessarily affect his religious notions and feelings, the religious feeling may exist in the most highly developed form, without belief in any superior personal power whatever.

Thus the monist may experience a religious feeling of the most refined and exalted nature, though most firmly confident that there is nothing in the universe superior to himself, nothing in the universe of which he is not himself necessarily a part; firmly confident that there could not be an infinite energy and still something over. For even here the contemplation of the infinite whole may impress such an one full as forcefully, as would the contemplation of an infinite being, personal and separate from himself, if such a thing could be imagined, looking down upon him from some lonely seat in space, and keeping pace in retreat with the growing intelligence of mankind.

The religious feeling then, or religion if better thus denominated, may be regarded as the harmonious mingling in consciousness of love and awe, experienced in the contemplation of an object vaguely conceived as being vast, dim, kindly and far away. Deeper still than this, I would define religion as in reality a reaction or a response of the soul or conscious being, to the gentlest, most ample and most harmoniously grouped of all the ether waves or other vibrations capable of affecting the mind by their action on the neurons of the nervous system, either in their conscious or subconscious functions. In short, religion may be regarded as the sense of the most refined music and harmony open to the experience of the human race, if even thus restricted.

In the childhood of the race, when uttered words came sounding back from cliff and crag and cave, men conceived that this was the voice of one calling from out of the unseen and they personified it and gave it a name; even deified it and called it, "Echo." Later when the gentle ether-whisperings that then as now were wont to flood the souls of men, were sent away to seek credentials of whence they came, the gentle and far-seeming echo that returned, men personified and deified and called it, "God."

We have proceeded thus far on the assumption that all mental affections and all outcome of mentation whatever, as well as all vital physical forms and processes, are due to vibrations in the neurons or ganglions of the nervous system, excited by the action of a form of energy of uncertain nature, operating upon, from or through, a class of peculiar vital corpucles. These activities are supposed to proceed partly from such ever active vital corpuscles and partly from radiant ether waves.

In order to obtain some degree of enlightenment as to the limitations of the forces producing and influencing our thoughts and feelings, it is pertinent to inquire once more whether there probably can be any response in the neurons to vibrations from external sources, where the internal structures and functions are not already attuned to the vibrations which they may receive and incorporate.

If a number of tuning forks be attuned in perfect unison, and mounted upon resonance boxes anywhere within several yards of each other, and then one of them be set into vigorous vibration, all the others will in a few seconds begin to vibrate. If the damper be gently raised from one of the strings of a piano, and the note corresponding to that string be sung loudly into the instrument, the string will be thrown into vibrations that may be heard for several seconds after the voice ceases. So also if several clocks be set on a shelf and then one of them be started to running, all of them with the same length of pendulum will likewise be set to running, while the others will not be affected.

Facts of this kind, which might be added to indefinitely, lend an air of strong probability to the inference that all vibrations that reach the neurons through the senses or in any other way are lost, so far as mentation is concerned, except such as find there other vibrations of an amplitude and quality fairly equal to their own. But it is essential

that this correspondence shall not be absolute and invariable. If absolute correspondence were required, if an incoming vibration could fall in with only such others as were its exact counterpart, the conditions required for arousing memories or releasing stored vibrations could not be fully met; for then only a very small part of the fading memory waves might find their counterparts and be recalled. But if memory waves might be aroused by others having only an approximate correspondence, a much larger range might be revived.

Again, among the revelations of the spectroscope, is the fact that only the kind of light absorbed by any substance while in a state of vapor, will be given out by that substance when made self-luminous. Sodium, for example, when in a state of vapor absorbs only the yellow rays of light, and when made self-luminous gives out only yellow light.

It is not then a violent presumption from this general law that in the metamorphoses of the processes of assimilation and nutrition, organic substances that are employed as food give out the same forms of force, the same nature of vibrations, that were absorbed by them from the sun and other luminaries during their growth, and incorporated into their substance; and that in the course of nutrition all these various classes of vibrations may be released and then utilized in the activities of the neurons.

It is most likely that it is the vibrations which are continuously and persistently given off in the neurons, that supply the force which directs the routine work of both mind and body from the time of their first active existence. Such vibrations must be present before the young being has experienced sight or hearing or touch or taste. The work they do is for the most part unconsciously or imperceptibly done, and the information they supply is independent of sense.

And yet even the quiet flowing of the blood in the veins and the currents of lymph in its ducts, may like the swish of the current of a river produce a vague awakening of consciousness or weave vague and dim shadows of ideas, which stored as memory tints fringe and soften the aspects of ideas arising later in life. Most likely it is some such vibrations as these that under the guidance of vital molecules or corpuscles are effecting the symmetrical growth of related parts, and the development of organs and tissues throughout the system. For all these are idealized or purposed forms that have their origin in the subconscious or the unconscious, and correspond to the consciously sense-given ideas that are later developed in conscious fields.

The energy derived from the food we eat, which itself is derived originally from the sun, and that which is gathered directly from solar radiation, might at first glance appear to constitute the entire supply available for the development and activities of both mind and body.

But there seems to enter into our thoughts, feelings and ideas, a class of elements so vague and gentle, that we scarce feel able to ascribe them to any of the sensible forms of force hitherto examined, as affecting our senses and operating on our minds or our processes of thought.

And yet all our thoughts and feelings, as well as activities of every other kind, both mental and physical, must be aroused in some such sense as that one might say they are produced by a form of the common energy coming either from far away luminaries, or else derived from the same source through the medium of nutrition. The driving power of the universe comes wholly from natural sources. There now goes on no process of creation; no miracle now interferes with the course of nature.

It follows then, that every springing plant, every unfold-

ing bud, every leaf in its pattern of shapeliness, every flower with its enchanting charm of fragrance and beauty, every fruit in its wealth of tint and flavor, whatever may have been its beginning, and whatever may still be the guiding-power, is now built up and developed by the aid of the fostering forces of nature playing upon it mainly from the worlds beyond.

It is the tiny waves of the ether, coming chiefly from the Sun that by their ceaseless peltings, drive every atom and every molecule into its place. Animal life derives nearly, if not quite all, its incorporated sustenance, either directly or indirectly from the plant; and thus from ether waves that are essentially light and heat and chemism and the like, all of man, except the mysterious soul that animates him, must ultimately spring.

But light and its kindred forces come to us from other sources than the Sun. And pursuing the inquiry further, we come to realize that if the worship of the Sun was a generous recognition of the power that orb exerts in the maintenance and control of life in the earth, those who chose their deities from among the stars approached still nearer to the proximate source of the tenderest feelings that minister to the pleasures of earthly existence, namely: love and religion. For aside from any assertion of special religious experience, or of fancied revelation, the feeling recognized as religion pervades the human race. Not only is this true of man, but a similar feeling is without doubt experienced by the lower animals as well.

The multifarious creeds and systems of mythology and so-called theology, that fleck the fields of history and geography, are but the outgrowth of the craving and hunger inherent in the human mind and heart, and they all spring primarily from the religious feeling implanted by nature from the very beginning in every human breast.

It has been conjectured that every inch of space in the whole vault of the heavens is occupied by the surface of a sun; and from this assumption it has been reasoned that somewhere in their journeyings through endless space, the rays of light must be dissipated and lost; since otherwise, the entire vault of the heavens must appear as a solidly luminous expanse.

And that light and heat and their like are lost to all human perception, is a conclusion that would naturally follow from the laws by which the transmission of all radiant energy is probably controlled. For, since as already pointed out, and as we have increasing reason to believe, even though it be not satisfactorily proven, the waves of which radiant energy consists, grow milder, gentler and weaker, even if not slower, as a necessary result of diffusion, they must somewhere in boundless space become too mild to produce impressions as light or heat. And, moreover, they must somehow and somewhere be changed back into the vibrations of gravity from which they originally sprung.

And when these forms of force with such others as may have possessed the power of affecting sensation, have subsided below the point of intensity at which they may produce sensations, might it not be that they continue to impress consciousness as the gentlest and most grateful of all the influences it is capable of receiving?

Might it not be that light and other kindred forces, even from the farthest stars, softened till they have subsided beyond all ordinary recognition, have become organized in the food we eat, to be transformed in the processes of nutrition and retrograde changes, into a residuary store of gentle vibrations in the neurons; and that there they are capable of responding to brother waves coming from the original, or other and secondary but related sources?

If this be true, then as naturally as ^{the} stars give out their light, would the soul dispense this ^{the} store of gentle

forces, and most likely too, and even of necessity, in the way in which it came? For, "Love and love only is the loan for love." Or back toward its transformed and personified author it would be reflected, the very essence of love-religion.

Dominated and prompted by such influences, it is little wonder that men in all lands and in all ages have been led to the choice of deities whom they regarded as approving what is deemed to be righteous and kind, and as seemingly the adequate source and author of all that is gentlest and best in their minds and hearts.

These benign and gentle influences exerted by the stars, it is easy to believe, have much to do in directing the course of life upon the earth. "Canst thou bind the sweet influences of the Pleiades?" are the words that Job puts into the mouth of Jehovah. There does not appear to be in the brilliance of the sun, the gentle influences which might produce and sustain the most agreeable states of feeling we are capable of experiencing. Delightful reveries, gentle reminiscences, do not invite his glare, but court the starlight rather. If this be true, it can hardly be that the sun is the only agent employed in calling the gentlest of all our affections and experiences into being; and surely not, unless it is capable of giving out the gentle forces from which they are evolved. For, as upon an axiom, we may rest in the assumption that there can be no evolution without an equivalent antecedent involution. No creature is greater than its creator; no stream can rise above its source.

The tenderest feelings, then, the heart can know must have a higher origin, a gentler source than any of the familiar forms of the common force. And nothing else appears as their immediate cause except the fading undulations of stellar light as they journey through infinite space—"the sweet influences of the Pleiades."



AUG 1 1912

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